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Pensions and Benevolence

THE Committee which was formed in May last (1) to examine the charitable requirements of the electrical industry and the extent to which they were covered by present provisions and (2) to suggest any extension or modification of these provisions that might seem desirable, has issued a provisional report.

The document has been in the hands of representatives of different sections of the industry for the past week, but the general tenor of its findings was known to many, and well received by them, a month ago. As it is to come before a special conference in London on Tuesday next—the day of the E.I.B.A. Ball—we are publishing an ample extract elsewhere in this issue so that everybody interested, either personally or in a representative capacity, in the electrical industry may be fully acquainted with the details of a plan upon which much special knowledge and expert planning have been brought to bear.

It should be clearly understood that the idea originated in the mind of Mr. Frank Parkinson, who, while acting as president for the year of the Electrical Industries Benevolent Association, felt, as many have done before him, that the electrical industry had left much undone in preparing for the prevention and alleviation of distress amongst those who gained their livelihood in its ranks.

The Committee was not, however, a committee of E.I.B.A., nor is the report addressed primarily to that or any other organisation, for the conception is one taking the investigation far beyond the limits of the operations of existing organisations. If we may say so, the study resolved itself into an elaborately thought-out plan for contributory pensions for a multitude of men, combined with a far more comprehensive scheme for benevolence or distress relief than has hitherto been possible. That it has been introduced during Mr. Parkinson's presidential year strengthens rather than prejudices its claim upon our attention.

Since our benevolent movements began the electrical industry has changed beyond all recognition; industrial and trade conditions are altogether different; private and national schemes for amelioration and maintenance are in force which were not dreamt of in the early days; and insurance and actuarial experts have produced industrial group schemes which enable us to enter into arrangements which were formerly impossible. It is our duty to adopt measures suited to our day.

We have modernised the productive and distributive sides and lined up with other industries in many respects, but until now no large-planning scheme has been advanced for providing on a sound basis for the exceptional or ultimate needs of those who have a claim upon the industry. Here we have placed before us a scheme involving the setting up of a Central Organisation, and affiliation of private pension schemes to this organisation. E.I.B.A. is mentioned as suitable to form the nucleus of this body.

Gratitude is due to the members of the Committee who have tackled a very difficult matter in so thorough a manner, and we believe that we can rely upon next week's representative gathering of different interests to give it the serious consideration that it merits. The conclusions and suggestions have given us all something well worthy of our deepest thought, but the scheme calls for a general spirit of co-operation.

Our own attitude of mind is to view the subject in the broadest possible way, and we appeal to all interests, including those who have rendered such excellent service in the cause of E.I.B.A., to follow our example. What will be done must rest ultimately with those who constitute, or control the destinies of, the industry.

The report is, of course, provisional, but we hope that next week's meeting will afford definite proof that the very keen minds which control our businesses wish progress to be made and are prepared to co-operate in

facilitating the next stage, whatever that may be. In any case, it seems essential that the Committee which has already so fully justified its existence should continue its study, and we believe that if Mr. Parkinson can be prevailed upon to hold office as E.I.B.A.'s president for a second year, continuity and co-operation, which are so necessary at this stage, will be assured.

Distribution

THERE has been no further announcement in the House of Commons regarding the Distribution Bill which is to come before Parliament during the current session, but it is stated in some quarters that it will be introduced before Christmas. It is still doubtful, however, whether the measure will be in accord with the spirit of the season. A deputation of representatives of the smaller undertakings met the Minister of Transport on Tuesday and presented their views, which we have already dealt with in these pages. The principal contentions are that public control should be preserved and the identity of existing local undertakings retained. Area boards should be set up after full local inquiries by the Electricity Commissioners, and each undertaking should appoint representatives to the boards. Mr. Burgin also received a Scottish deputation on the matter on the same day. It is understood that the Minister gave the impression that amalgamation schemes would be prepared by the Electricity Commissioners in the form of Provisional Orders, each of which would have to secure the approval of Parliament. The supply company associations have formed a joint committee, which has been in consultation with the Minister on a number of points (see page 720).

The Rural Schemes

AN account of progress in four rural areas—Bedford, Norwich, Dumfriesshire and Kirkcudbrightshire—given in the latest Report of the Electricity Commissioners further substantiates the claim of the domestic load to be regarded as the most important factor in extra-urban development. Nevertheless, although the kWh sold per residence is high, and in two cases well above the figure for the country as a whole, the present financial position of these areas seems much less satisfactory than would be expected for comparable towns. This is due mainly to the small number of kWh sold per £1 of distribution capital, which (apart from Bedford with its preponderating brickworks load) is less than one-third of the national average. The revenue obtained per kWh for domestic supplies compares favourably in the lowness of the figure with that received by ordinary undertakings with similar outputs and the proportion of capital spent on hired apparatus and wiring is higher—both items that favour progress. It may be deduced from this Report and from the statistical survey of rural electrification given by Mr. G. V. Harrap in the I.E.E. *Journal* that the prospects of rural electrification are by no means unpromising, provided it is realised that immediate returns on outlay are not to be expected. His investigations confirm that the cost of bulk energy is relatively unimportant compared with that incurred in distribution and that the way to reduce the latter is not so much by cheapening technical equipment as by making more use of it.

A 200-kV Cable

THE non-membrane type of impregnated pressure cable that has successfully passed its long-period test in England and is undergoing a similar independent test abroad is, we believe, the first underground cable to be designed for so high an operating pressure as 200 kV. It differs in several respects from the gas-impregnated cable with dry-paper dielectric for 132 and 66 kV (also a product of Callender's research laboratories) which was described by Mr. A. N. Arman to the I.E.E. Transmission Section last March. Not the least of the merits of the new cable is that it can be regarded for purposes of transport and installation as though it were of the ordinary solid kind. During the stability test the equivalent of 202,000 kW on a three-phase feeder has been transmitted. A likely future contingency is the need to carry loads of this order of magnitude over sections of a transmission system where overhead lines may not be permissible and there is insufficient space available underground to run a multiplicity of lower-voltage cables.

Electricity for Transport

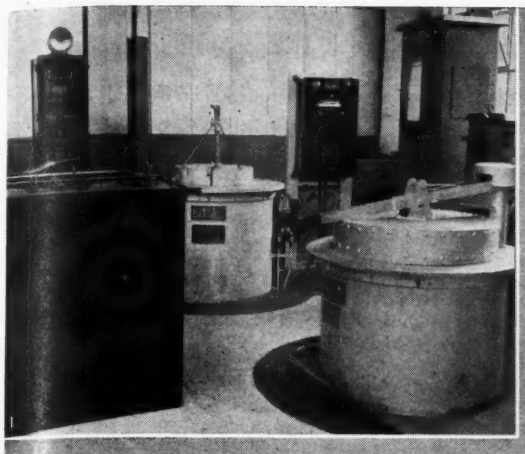
HOW much of the tramway load that has been lost to the electrical industry due to the supersession of tramcars by motor buses could have been retained but for high charges for electricity? In an article published in this issue, Mr. E. T. Hippisley bases his comparative estimates of the costs of running trolley, petrol and Diesel buses on the conservative figure of 0.65d. per kWh. In Leicester the Electricity Department has offered to supply energy for six-wheel 70-seater trolley buses at 1.25d. per vehicle-mile, which Mr. B. England, the transport manager, calculates as equivalent to 0.49d. per kWh at the motor. His criticism of the present charge of 0.8d. per kWh at the substation for the tramcars seems pertinent enough, but illogicalities of this kind are not confined to one city. Indeed, the large price variations between different areas for transport (Mr. Hippisley refers to a range of from 0.5d. to 0.95d. or more per kWh) might appear to depend merely on whim, were it not probable that they are a legacy from the long ago when the tramways were milked to aid the struggling electricity undertaking. Now such an attitude has not this excuse (the charges in some towns should be compared with the grid tariffs, with due allowance for diversity), and prices that were obtainable for existing tramways cannot be regarded as competitive when deciding the merits of new systems.

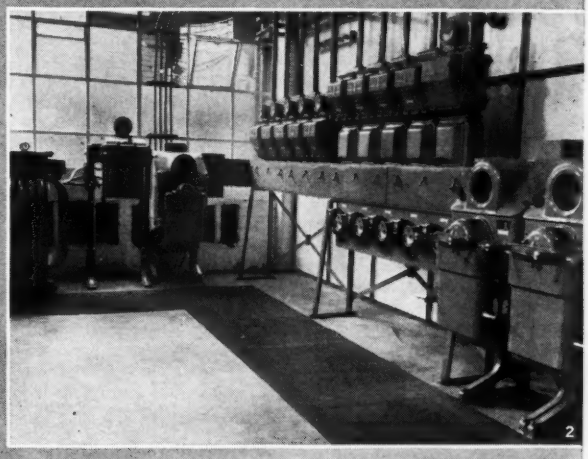
Smaller Electrical Markets

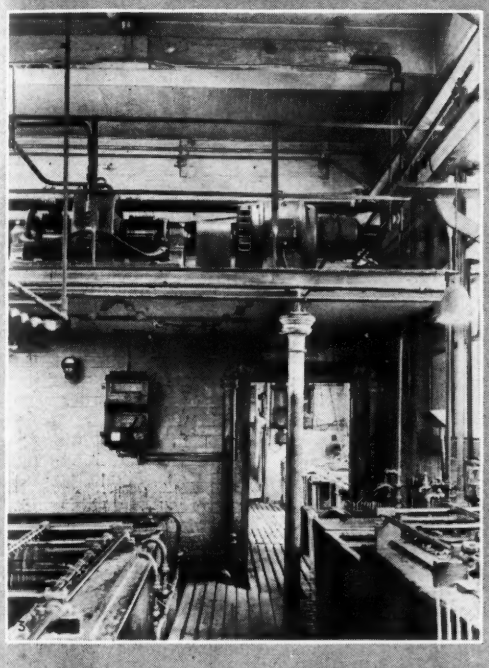
THE October export figures, so far as electrical equipment is concerned, reveal an encouraging position in regard to the smaller overseas markets. Satisfactory as has been the rise in the figures in the last year or two, it has been apparent that without the extensive development in one or two cases, notably South Africa, Australia and New Zealand, the showing would have been poor. In recent months the improvement has been more widely distributed, foreign as well as Empire countries sharing in the monthly increases. Whereas in the first ten months of last year exports of electrical goods and apparatus to countries not enumerated separately in the Board of Trade returns dropped from £1,339,199 to £1,299,816, this year they have expanded to £1,764,211. There was likewise a reduction from £90,790 to £88,181 in shipments to Canada against an increase to £142,890 this year; from £73,249 to £59,781, with a rise to £118,423 in the case of Rumania; from £36,550 to £25,379 and up to £53,659 in exports to Greece; and from £73,671 to £60,430 and up to £130,771 in the case of Portugal.

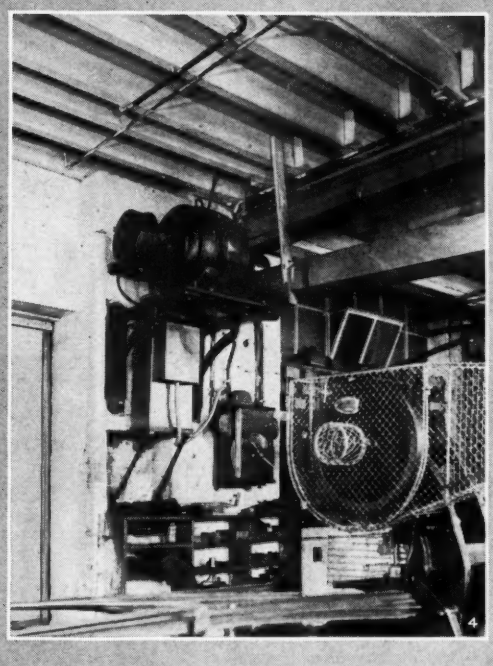
The Glasgow Exhibition

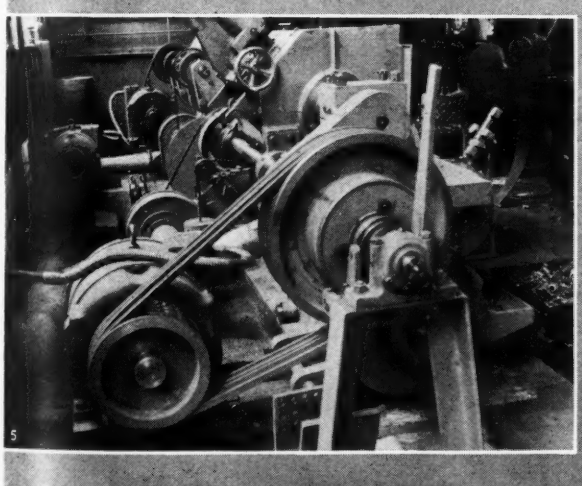
DEFINITE indication of electrical interest in next year's Empire Exhibition in Glasgow is the receipt of a preliminary list of exhibitors in the Palaces of Engineering and Industry which contains the names of between thirty and forty concerns whose displays will have an electrical flavour. The names of several leading manufacturers appear, B.E.A.M.A. having made the exhibition an "open" one for its members. Everything is being done to make the exhibition a success. The continuance of the Paris International Exhibition next year was considered by the Federation of British Industries likely to be prejudicial to the Glasgow display. Apparently as a result of the Federation's representations the British Government has informed the French Government that it will not continue the British Pavilion at Paris.











[*Elec. Rev.* photos.

Electrical Equipment in a Spring-making Factory (See next page)

1. Tool hardening and tempering furnaces. 2. Sub-station showing main distribution board and (left) transformer and circuit-breaker for condenser. 3. Chromium-plating shop; generator on overhead platform to save space. 4. 20-h.p. group drive for presses with local p.f. correcting condenser. 5. Spring-grinding machines. 6. Cellulose spraying booths and drying ovens

Electricity in Spring-making

Furnaces and power factor correction

Where precise control and high quality and finish are called for electrical methods are essential

WE left the Redditch spring works of Herbert Terry & Sons, Ltd., recently not only with some profitable information as to the electrical applications peculiar to the production of springs, but also with the certain knowledge that electricity is indispensable to the precision control and exacting demands in quality and finish associated with light engineering processes.

For such work it was surprising to learn of a monthly consumption of about 40,000 kWh, to take the latest figure, and of a maximum demand of 450 kVA, although we are accustomed to keeping an eye on factory output figures when searching for the explanations of process consumptions.

The toolroom, showing the Humbarton distribution line [*Elec. Rev. photo.*

The furnace load exerts a big influence on these statistics, there being over 120 kW of industrial heating equipment installed. There is also a total motor load of about 350 h.p. in the factory, the motors varying in size from 1 h.p. to 40 h.p. Energy is received from the Shropshire, Worcestershire, and Staffordshire Electric Power Co. at 11 kV and is transformed to 400/230 V, three-phase, by two 400-kVA Brush transformers in a roomy and light sub-station measuring 30 ft. by 25 ft. This has been recently established partly as a contribution to a general scheme of works modernisation and partly to cope with the increased load brought about by works extensions.

Works main distribution is effected by an English Electric board built up with fifteen 150-A and 300-A "Combination" switch-fuses and four 600-A oil circuit-breakers—two incoming, one controlling the main furnace supply, and one for the new building across the road.

For power factor correction there is in the sub-station a 160-kVA T.C.C. condenser served by an E.C.C. auto-transformer so arranged that for light-load periods the condenser supply can be changed over from 600 V to 400 V. At 400 V the condenser output is more nearly compatible with the light load of the factory. The main p.f. correction system is supplemented by local condensers serving individually motors of 8 h.p. and above. These local condensers are connected in the stator circuits. In addition to affording the necessary "adjustment" for the main condenser from leading on light load, they also save the no-load losses of the condenser transformer equivalent to those for the additional transformer capacity which would be required were the correction effected wholly by the main condenser plant.

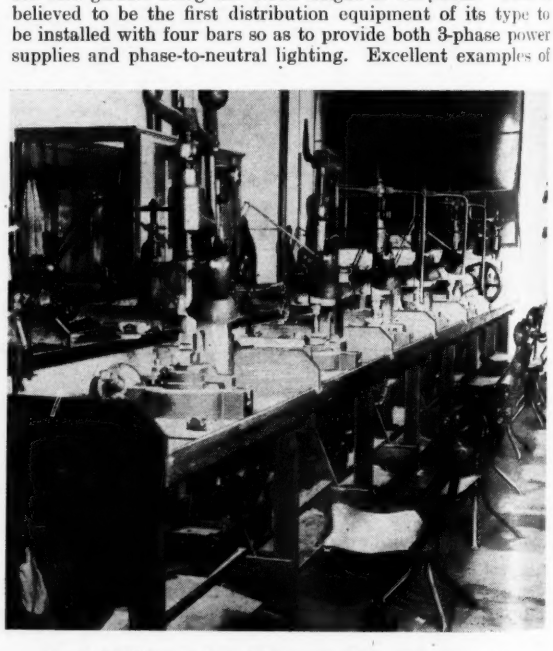
Hardening and tempering play a particularly important part in spring manufacture, and engaged on such work we saw a 30-kW, a 24-kW, and two 18-kW Wild-Barfield air-circulation vertical cylindrical furnaces. The work handled by these furnaces varies so widely—from very fine springs spaced out on trays which are put into the furnace in tier formation to, say, steel spanners which are just put into the container as a "basket full"—that the following figures are more in the nature of present practice than furnace capacities: 30-kW furnace, 200 lb. light to 2,000 lb. heavy; 24-kW furnace, 30 lb. light to 300 lb. heavy; 18-kW furnaces, 20 lb. light to 200 lb. heavy.

Another interesting furnace installation is that recently erected in the tool-hardening and tempering department in the new building. In addition to two high-speed muffle furnaces there is one hardening and one tempering equipment, all of Wild-Barfield manufacture with load control by Brookhirst contactor panels and heat control by Foster instruments. Time switches not only permit automatic switching according to desired duration of heat treatment, but they are also set for switching on early in the morning so that the furnaces are heated up by the time the workmen arrive.

The 15-kW. hardening furnace is of the normal vertical cylinder non-circulation type, whereas the 10-kW tempering furnace is an air-circulating equipment of the same shape. Because this installation is necessarily near a forge hammer, vibration difficulties arose in connection with the instrument pillar. They have been overcome, however, with surprisingly satisfactory results by mounting the pillar on a platform and suspending this from a surrounding frame by a large number of short helical springs.

The large new tool room (210 ft. by 60 ft.) houses sixty or so machines, which include some excellent examples of "incorporated" drives, such as a Keller die-sinking machine with seven motors and central control, and Thiel filing and sawing machines.

Electricity distribution to tool-room machines is afforded by a Humbarton plug-in enclosed bus-bar line, suspended from the roof girders along the whole length of the room. This is believed to be the first distribution equipment of its type to be installed with four bars so as to provide both 3-phase power supplies and phase-to-neutral lighting. Excellent examples of



Local lighting in the light press shop [*Elec. Rev. photo.*

built-in drives were also seen in the machine shop proper, where a very comprehensive lay-out includes a battery of "Index" automatics whose multiple operation work and almost human manipulation of bar material never fails to fascinate.

This applies also to the automatic machinery in the spring-coiling department where, without continual individual attention, both tension and compression springs are produced. As an example, we watched the production with great accuracy of valve springs, which are coiled from ½-in. diameter wire with ten coils imparted to a 2½-in. long spring of 1¼-in. outside diameter. The whole of the operations, including the cut-off, are carried out at a production rate of 10 to 15 springs per minute. A single 4-h.p. motor is responsible for all the operations.

Grinding Machines

Other remarkable machines are those which put the "flats" on the ends of spiral springs. A number of springs are mounted in a frame horizontally and placed between two vertical grinding wheels. The frame is oscillated and revolving wheels feed inward to a predetermined spring length, and in doing so they grind both ends of the springs. When the feed stops the grinding continues owing to the tension which has been put on the springs. Each of these grinding machines is driven by a two-speed 5-h.p. motor. The low-speed enables the grinding wheels to be dressed by a special tool incorporated in the machine.

Barrel scouring is employed extensively, and to quote one example a dry-scouring battery has 24 barrels at about the floor level driven from a central shaft through bevel gears and a secondary row of barrels 3 or 4 ft. above the other barrels similarly driven from a second shaft which is chain driven from the first one. A 12-h.p. motor has a belt drive on to the bottom shaft.

Floor-space saving schemes in the plating shops display a good deal of ingenuity. The generating plant, with its 1,500-A 8-V generator, 20-h.p. motor, the exciter is housed on a platform about 8 or 9 ft. above floor level. To eliminate vibration the girder joists are supported on stanchions erected independently of the building. A large plating vat holds about 400 gal. of fluid, while served from the same generator there is also a small hard chromium vat.

In another plating room equipment for such plating as lead, zinc, cadmium, copper and brass are served from four machines with a total capacity of 6,500 A mounted on a platform in a similar manner to the one just described.

Another application of thermostatically controlled electric heating is represented by the drying ovens in the cellulose-spraying department. Accuracy of temperature control is required for the crinkled finish. There are two eight-compartment ovens, each compartment measuring about 4 ft. by 3 ft. 6 in. by 2 ft., and in each six 150-W tubular heaters are mounted at the top. Each compartment of these ovens is separately thermostatically controlled to a limit of 180 deg. F.

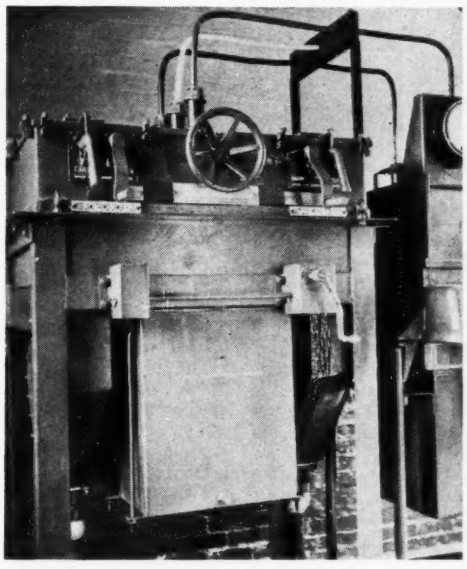
Because of the extensive use of the company's "Anglepoise" adjustable lamps, there being one for every machine, the works as a whole represents one of the finest examples of local lighting that we have seen.

Split Conductor Tees. By "Mainsman"

THE following is a description of a comparatively cheap but reliable method of making a tee off a six-core split-conductor high-voltage feeder.

If the tee is made cable to cable, two objections become apparent. The first is the impossibility of carrying out any work on the feeder without shutting down the teed-off supply, so that switchgear at either side of the tee cannot be serviced thoroughly; the second is that an expensive six-cored split-conductor switch is required at the end of the tee.

A means of overcoming this was devised by using reactors and interlocked switchgear as indicated in the accompanying illustration of a Crompton Parkinson ring-main unit in which the ideas were embodied. It is of the utmost importance that each pair of splits shall be energised or made dead at exactly the same moment; otherwise the protective gear at other points will operate. In order to overcome the trouble which would obviously arise with the use of manual gang-operated isolators, such as are fitted to standard switchgear, a short-circuiting device was fitted, controlled by a handwheel in the centre of the gear. This, as the line diagram shows, either makes the cable the equivalent of a three-core cable (splits in shortened position), or, with the short-circuiting device in the off position, leaves the split conductor protective gear operative.



Crompton Parkinson ring-main unit employed for the purposes described in the article

This short-circuiting device is interlocked with the isolators, which are operated by the levers to left and right of the handwheel. It is impossible to open or close these switches until the handwheel has been turned to the three-phase position, that is at which the splits are temporarily shorted. The short-circuit is applied to outgoing connections on each isolator, thus shorting the split-conductor protective relays on switchgear at the next switching station on each side of the unit.

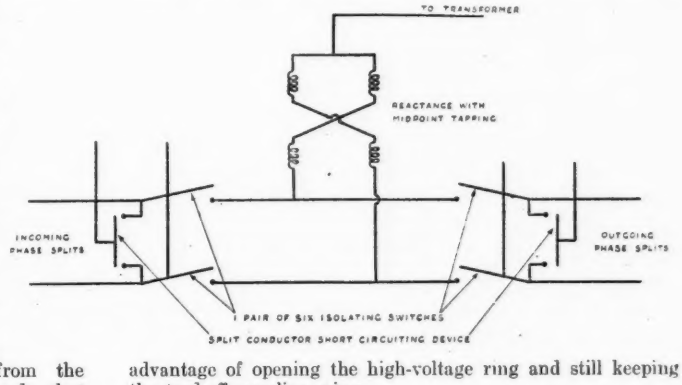


Diagram showing one pair of splits only

To achieve the effect of a plain three-phase oil circuit-breaker to control the teed-off supply, three centre-tapped reactors are connected, one across each pair of splits, and the tee is taken from the centre point. These windings are so arranged that under normal conditions the currents are in opposition in the two halves; therefore, the resultant impedance is at its lowest value, but with a fault on one split the currents are flowing together and the impedance increases to its maximum value, which gives rise to an out-of-balance current on the complete reactor sufficient to cause the split-conductor relays to operate.

These reactors are oil-immersed and housed in the tank placed immediately under the handwheel. The impedance of the reactor under normal conditions is of the order of 0.05 ohm, rising to approximately one ohm under maximum fault conditions, but these figures are governed somewhat by the situation of the unit and the general electrical conditions of the system. This also limits the number of units that can be employed on any one feeder, as if an excessive number of reactors are connected across the splits the protective gear will be rendered inoperative.

The cost of this unit complete with the oil circuit-breaker is approximately £300 less than the cost of three split-conductor oil circuit-breakers, and it gives the very decided advantage of opening the high-voltage ring and still keeping the teed-off supplies going.

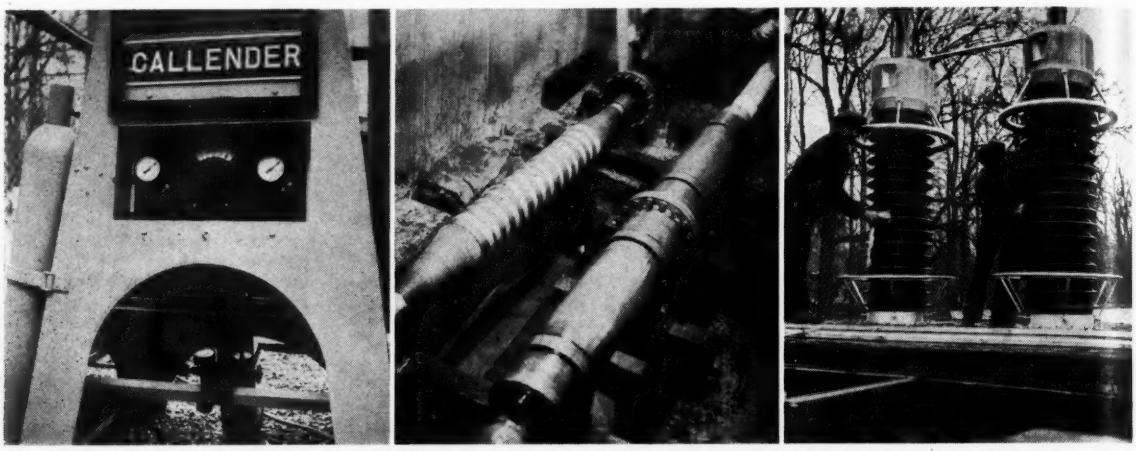
The Impregnated Pressure Cable

New design for 200-kV operation

TESTS have been completed on the compound - impregnated pressure cable which has been developed for 200-kV working as a result of six years' research at the laboratories of Callender's Cable & Construction Co., Ltd., at Wood Lane.

The dielectric is similar to that of the solid type, in which oil or compound is employed, and the cable is transported and installed in the same way. After installation, dried nitrogen is admitted at the base of the two sealing ends and is raised in pressure to 200 lb. per sq. in. It finds negligible resistance to its flow along the cable in the interstices between the insulation and the lead sheath and fills all voids. Strength to withstand the internal pressure is afforded by reinforcing the lead sheath with overlapping copper tapes.

No troubles of any kind or signs of deterioration were reported during the test at 260 kV, which lasted 5,000 hours through 200 heat cycles. Schering bridge measurements were regularly made up to 303 kV. The power factor of the dielectric was 0.25 per cent. and did not increase with rise of temperature, showing that risk of failure due to thermal instability is not a contingency to be provided for.



The new 200-kV cable: Gas cylinder, pressure valve and switch; joints in the cable; and sealing terminals

Tests up to 700 A and 60 deg. C. have been carried out, but the safe operating temperature is expected to be about 80 deg. C. Dimensions of the test length of cable were: Conductor area, 0.65 sq. in.; wall dielectric, 0.929 in.; and overall diameter, 3.46 in. The cable was buried 39 in. deep.

In ordinary solid cables voids are formed through the expansion and subsequent contraction of the compound and ionisation takes place in the voids when the electric stress exceeds 30 kV per cm. at atmospheric pressure. By applying gas pressure directly to the dielectric the ionisation voltage is raised. Accelerated ageing tests on cables with and without pressure showed that in the latter case the cable failed after 380 hours of daily heat cycles at from 120 to 140 kV per cm., whereas at 200 lb. per sq. in. the cable stood up to 1,441 hours of heat cycles at from 175 to 206 kV per cm.

During the stability test at 260 kV the difference between the highest and lowest power factor was negligible from zero to test voltage, ionisation remaining at all times less than 0.0004. Joints are of two kinds. A straight-through type allows free passage of gas; the other, containing a barrier, requires an external tube (in which instruments and check meters can be fitted) to allow the gas to go from one side to the other. The dielectric is coned in order to prevent the formation of large radial gaps in the paper due to movement of the joint or cable. The cone profile is designed to provide a longitudinal stress along the surface of the curved earth electrode, but in the direction of the paper laminations, of 2.4 kV per cm. The ferrule is of the same dimensions as the conductor and the diameter of the joint is determined by a permissible electric stress at the ferrule of 45 kV per cm. at working voltage.

Bakelised paper insulators are used at the sealing ends in view of the uncertain behaviour of porcelain under tensile stress over long periods. Clamping rings of gunmetal are shrunk on the bakelised tube. The stress cone of the sealing end is designed for a uniform longitudinal stress of 2.4 kV per cm. along the curved surface in the direction of the paper lamination. At the lip of the cone where it leaves the paper surface the radial stress is kept within 8.5 kV per cm. The cone profile controls half of the total voltage and the flash-over path is suitably designed to an average stress of 1.5 kV per cm. Resistance to flash-over is given only by gas under pressure, since the interior of the bakelite is not filled with compound.

Rigid supporting of the cable and joints is the only special point to take into account during installation. The system is normally gas tight, but a cylinder of compressed gas is permanently connected to the cable through a reducing valve that automatically maintains the pressure at the proper value in the event of leakage.

Gas leakage detection during fault conditions is arranged for by sectionalising the cable by means of remote-controlled valves in conjunction with barrier joints. Restrictors may also be used in association with the barrier joints, the pressure across them closing adjacent valves automatically.

Electrical Carbonisation of Coal

RESULTS obtained with a 30-ton vertical electrical retort, which has been built by the Detroit Edison Co. for carbonising bituminous coal, are given by H. Stevens in the *Scientific American*. During a typical twenty-hour run, 1,400 lb. of coke, 10,000 cu. ft. of gas (525 B.th.u.), and 15 gal. of tar were derived per short ton (2,000 lb.) of bituminous coal—an output which is said to be slightly better than that obtained with by-product ovens.

The essential difference between the two methods is that in the electrical plant the coal is heated directly from within instead of from the outside, and units of 30 tons or more can be constructed, whereas the by-product oven works most efficiently with a capacity of 15 tons. Other claims are that the absence of a complicated system of flues, regenerators, discharging pushers and elaborate equipment further reduces the capital expenditure, and the less land is required.

Maintenance costs are lower, as the equipment is not subjected to similar high temperatures, and fire brick can be used instead of silica. Operation costs are also less as the plant is nearly automatic. Moreover, by-product ovens must be dried out for months before charging. In the electric retort the rate of heat travel can be anything required between ¼ in. and 6 in. per hour of oven width, by varying the transformer tappings, so that the process yields three times as much tar or else makes coke six times as fast as the by-product oven, in which heat travel averages about one inch per hr. and cannot be regulated.

Some 350 kWh was consumed per ton of coal carbonised requiring 290 lb. of coal, compared with 292 lb. of coke (a more valuable fuel) in by-product ovens. By pre-heating the coal the electricity used would fall to 250 kWh per ton.

The charge in the electric retort is built up round a core or "starting fuse" of coke, which is a better conductor of electricity than is the coal. As the coal adjacent to the starting fuse turns into coke, however, it offers less resistance to the current than does the original core, in which the loose coal particles make a less close contact. On further heating the ring of newly formed coke shrinks and cracks, but not until a fresh outer layer of coal has been carbonised, each successive tubular ring offering an easier passage to the current.

Pensions and Benevolence

Suggestions for co-ordination and centralisation

A comprehensive plan for giving a greater measure of security to workers in the electrical industry

AT the annual luncheon of the Electrical Industries Benevolent Association in April the president, Mr. Frank Parkinson, suggested the formation of a committee (1) to examine the charitable requirements of the electrical industry and the extent to which they are covered by present provisions; and (2) to suggest any extension or modification of these provisions that might seem desirable. In the following month this Committee was set up, Mr. Parkinson being chairman with Lord Hirst, Sir Archibald Page, Mr. H. Marryat, Mr. W. B. Woodhouse and Mr. H. T. Young as members.

Last week the Committee circulated a provisional report the first section of which sets forth the scope of the inquiry. It was found difficult to define the term "electrical industry" precisely, but it is stated that the approximate numbers of people whose employment is immediately dependent on the use of electricity or the supply of apparatus are as follows:—(i) Employed in an administrative, technical or clerical capacity, 69,000 (including 19,000 females); (ii) other non-manual workers, 30,000 (9,000 females); (iii) all workers, including those in (i) and (ii), 370,000 (90,000 females).

There is a necessity for organised effort (with adequate funds) to provide for old age, sickness and misfortune (physical disability, unemployment, destitution of dependants, etc.). Different treatment is appropriate to the different types of need, although there are definite connections between them, and it is unwise to attempt always to draw sharp distinctions.

Existing Methods

It is still found necessary to supplement State schemes by private arrangements. The Committee gives a brief outline of such arrangements. With regard to provision for old age it is not considered satisfactory that an employé should be dependent in his old age on haphazard saving in his younger days or on the discretionary charity of his employers, and there is an increasing tendency to organise schemes on an actuarial basis. Often, especially where the number of employés is not large, the risk is spread by taking advantage of facilities offered by insurance companies.

At the present time schemes arranged with insurance companies provide for security of capital with compound interest at approximately 3½ per cent. Generally they provide (a) that an employé on retirement, usually at 65, is entitled to a certain number of pension units (a unit is £1 per annum) according to his total contributions; (b) if an employé dies before 65 certain death benefits are payable, either as a lump sum or as a widow's pension. The relative emphasis laid upon these two types of benefit varies according to circumstances—it is said, for example, that young employés are attracted more by large death benefits than by generous pensions.

There are several methods of collecting premiums but the following is a common one:—(a) Each employé in the scheme is allowed to purchase a specified number of pension units each year according to his salary, making a flat weekly payment per pension unit; (b) the employer pays the difference between these contributions and the true annual premium. This amount varies somewhat from year to year because the true premium required each year to secure stated amounts of pension at a certain age depends on the employés' present age.

It is impossible to run a private pension scheme on an actuarial basis unless the law of averages has free play and so it is usual to stipulate that at least 75 per cent. of eligible employés must join a scheme and a minimum number (usually 50) is fixed. It follows that a large body of employés cannot be covered by any private scheme. When an employé in such a scheme leaves the service of his employer it is usual to provide that he shall receive back his own contribution but shall lose the benefit of any accumulated contributions made by the employer. The consequent tendency of such schemes to bind men to their employers and to discourage attempts to improve their position and prospects may not be desirable from the social point of view.

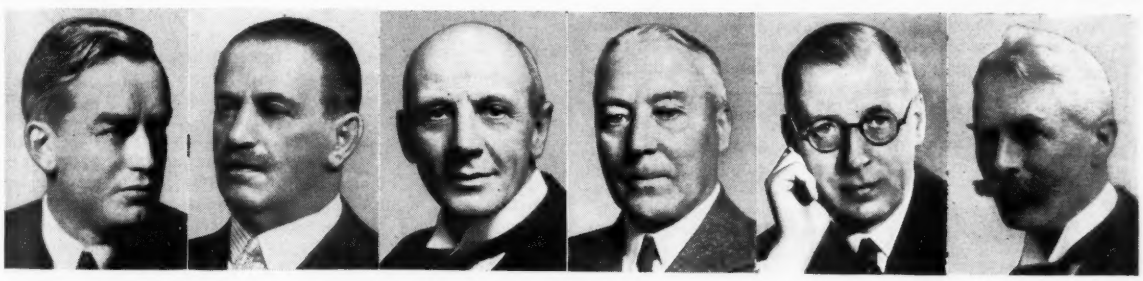
The Committee has no definite information as to the number of employés in the electrical industry already covered by superannuation schemes but it must be fairly large. The bigger firms are rapidly adopting some form of pension scheme and municipal undertakings are covered by special legislation. The only collective scheme of which the Committee has knowledge is one at present under consideration by a trade association.

Sickness and Misfortune

With regard to sickness it is said to be possible to predict with some accuracy the incidence of bona fide sickness in a representative group of people, but the possibility of malingering calls for considerable supervision making it difficult to operate any form of sickness insurance except on a somewhat parochial basis. Individual employers frequently pay employés' salaries during temporary disability and it is a common practice to make further provision by individual insurance policies, by membership of mutual benefit societies or by the formation of local sick clubs. In such cases the necessary supervision can be given and the extension of these practices is to be encouraged.

In a narrow sense the word "charity" should, perhaps, be applied only to the relief of those types of need classified under the heading "misfortune," although many charitable demands are arising at present as the consequence of inadequate provision for old age. The most comprehensive arrangements for superannuation cannot eliminate a large amount of unforeseeable hardship. The belief that a generous pension scheme removes the need for further charitable activities is not supported by experience.

It is difficult to predict the demands which may arise under this heading. Various benevolent organisations exist to deal with such cases and some of the large firms have internal arrangements for similar purposes. The Committee believes that the total annual amount distributed through these channels does not exceed £15,000 to £20,000. It is said that the relief available is often insufficient to raise the recipients above the border line of destitution and that the position would be worse if all cases of need came under notice.



The members of the Committee. Left to right: Mr. F. Parkinson (*Howard Coster*), Lord Hirst (*Elliott and Fry*), Sir Archibald Page (*Elliott and Fry*), Mr. W. B. Woodhouse (*Elliott and Fry*), Mr. H. T. Young (*Paul Tanqueray*), and Mr. H. Marryat (*Elliott and Fry*).

Inadequate Resources

Many people do not avail themselves of organised charity, even in the most desperate straits, because the existence and work of a charity may not be well known or it may be supposed that its funds are available only to subscribers; or inadequate support may have forced a charity to adopt a stringent attitude and thus deter many deserving cases from applying for relief.

These considerations suggest that the present provisions for dealing with misfortune in the electrical industry are inadequate even in the favourable circumstances which exist to-day. In less prosperous times the charitable demands will increase precisely when the resources available are diminishing. It is obviously wise to provide for this contingency now.

The Committee considers that an average income of £50,000 to £60,000 per annum is needed to provide for cases of misfortune among non-manual workers, while if the existing range of charity were extended—as it should be—to include all workers something like an average income of £150,000 would be needed. The present income is insufficient.

It is questioned whether it is sound for charitable associations to confine their activities to the dispensation of relief without any attempt to correlate this work with any form of systematic insurance for superannuation.

The Committee then proceeds to outline a general scheme of organisation to remedy the deficiencies pointed out, and endeavours to make specific proposals for dealing with the various types of need.

A Central Organisation

If no arrangements already existed the Committee would recommend the establishment of a single organisation. As, however, in the electrical industry there are several organisations and many private funds in existence the aim is to co-ordinate and supplement these activities. The need for a central office remains, but its functions must be so regulated as to harmonise with the work of other people.

The outline of this central office (which should be incorporated in some form) might be as follows:—(a) Control by a strong committee possessing expert knowledge of the industry; (b) a salaried executive staff; (c) local advisory committees; (d) division into three departments—propaganda, superannuation and insurance, and charity and discretionary funds.

A central superannuation scheme (providing death benefits and pensions at 65) should be instituted and made available, in the first instance, to all male non-manual workers in the industry. The scale suggested in the table seems to the Committee to be most suitable, and should be adopted as a minimum standard throughout the industry. The increase of premiums with advancing age tends to be detrimental to the employment of older men. In a large group of lives, however, age and salary distribution can be averaged and the result predicted within very close limits. It is then possible to state a flat weekly premium per life which will cover all risks, and the Committee recommends that this should be done. The success of such an arrangement depends upon the loyal co-operation of those employers who, at any given time, happen to have a large percentage of young employés.

At the present time the average premium for the benefits set out in the accompanying table should be 3s. weekly per pension unit. This is on the high side, as it has been loaded to provide a reserve for the equalisation or reduction of future premiums and also to provide a surplus for a discretionary fund. This premium, taken in conjunction with the scale of pension units allowed, is equivalent to about 7½ per cent. on salaries, half of which should be paid by employés. An appendix gives examples of the operation of the scheme.

Employers are asked to give special consideration to the cases of men who retire during the first ten years or so without accumulating an adequate pension.

Extra pension could be purchased according to a table given in an appendix showing the single premiums payable per £1 of pension for ages from 20 to 64.

Affiliation of Private Schemes

The Committee urges that private pension schemes should be affiliated to a central scheme in the following manner:—(1) An affiliated scheme should pay to the Central Office 1d. per £1 of salary of every male non-manual worker member. The money would be transferred to the discretionary fund of the Central Office. (2) Arrangements for transfer of employment should be made on lines laid down in an appendix. This provides for movements of workers between firms classified as follows:—Members of the central pension scheme; employers operating an affiliated scheme; employers operating a non-affiliated scheme; and employers having no pension scheme outside the electrical industry. This would form a comprehensive chain of pension schemes.

(3) Affiliated schemes should be examined with a view to ascertaining (a) whether it is possible to assimilate their benefits to those offered by the central scheme and so to secure a degree of uniformity throughout the industry, and (b) what is the maximum capital sum which can be made available on transfer of an employé to fresh employment so as to ensure, if possible, that the employé shall not lose accrued benefits unless he leaves the industry.

It is felt that a central pension scheme is best arranged with insurance companies. If, as the Committee hopes, the central scheme grows until it becomes the biggest unit in the electrical industry, the business should be placed in rotation with more than one company. At the end of each accounting period the Central Office, having paid the insurance companies the ascertained premium, would transfer to its discretionary fund a calculated amount and retain any surplus in a reserve for the equalisation or reduction of future premiums.

The Committee reiterates its conclusion that sickness can only be dealt with by local organisation, but considers that the Central Office could do a great deal to encourage the formation of local sick clubs.

The voluntary system is still regarded as the keystone of any organised attempt to relieve misfortune. At the same time the Committee would like to see the funds raised by voluntary subscription increased by some source of income which would be relatively stable and would cost little to collect. Hence the proposals to load the pensions premium and to draw an affiliation fee from private pension schemes. The money so raised would be transferred to a discretionary fund for the relief of misfortune. It would not affect the urgent need for a substantial increase in voluntary contributions, but it would do something to reduce the serious existing gap between the need and the available revenue.

An objection is that the burden would fall entirely upon members of pension schemes; the ideal, of course, would be that a similar revenue should be received in respect of every employé who is eligible to claim on the discretionary fund. The Committee does not attempt to deal with the administration of the fund.

It is considered inadvisable to launch the suggested schemes on too ambitious a scale until experience has been gained in their working. In the first instance, therefore, their operation should be limited to workers employed in an administrative, technical or clerical capacity, the central pension scheme being further limited to male workers only. It is not suggested, however, that these artificial distinctions between different kinds of workers, adopted for expediency, should be perpetuated, nor should the electrical industry rest content until everyone who has served it, in whatever capacity, enjoys an equal degree of security.

The expenditure, while large, will be less onerous, perhaps, than is often supposed as there are two considerable items on the credit side. In the first place *ex gratia* payments to older employés will be reduced until they finally disappear, and in the second place with greater security employés will give better and more willing service.

The E.I.B.A. as a Nucleus

With regard to the Central Office, it seems better to utilise an existing organisation than to set up a new one. The Electrical Industries Benevolent Association appears to be the most suitable for the purpose. That body already has a wide field of activity free from sectional bias, and has an enthusiastic chain of local committees. Its affairs would be directed, more or less as at present, by a president supported by a committee well acquainted with conditions in the industry, although certain changes in constitution and internal organisation might be found necessary.

The Committee has no doubt that the governing body of the E.I.B.A. will give the report careful and sympathetic consideration, and it is hoped that it will find it possible, without jeopardising the development of its present activities, to undertake the additional work which the furtherance of the Committee's proposals would entail.

It is stressed that the Committee's remarks are not addressed primarily to the E.I.B.A., nor, indeed, to any other association. They are addressed to all who direct the destinies of the industry, for without their enthusiastic support little can be done. "Matters of organisation, of money and, in some ways, of sentiment will militate against the adoption of our proposals, but these troubles can be overcome, and it is our earnest desire that they should be, so that in the electrical industry, at least, it may truly be said 'adversity is not without comforts and hopes.'"

In conclusion the Committee explains that the report is termed a "provisional" one, not because the Committee has failed so far to crystallise its ideas, but because the members feel that they ought to submit those ideas for the consideration of their colleagues in the industry before they commit themselves to final decisions.

SCALE OF PENSIONS.

Grade.	Annual salary or wages. From	Annual salary or wages. To	Pension units allowed to be purchased each year.	Benefit payable in the event of death during service.
A	£78	£130	1	£100
B	131	182	1½	150
C	183	208	2	200
D	209	250	2½	250
E	251	312	3	300
F	313	400	5	500
G	401	—	6	600

Together with employés' insurance contributions to date returned in one sum without interest.

NOTE A.—Pension guaranteed from age 65 till death or for five years, whichever is the longer period. NOTE B.—On withdrawal employé's contributions are returnable either in a lump sum or by instalments at the discretion of the trustees (subject to a stated weekly minimum based on grade).

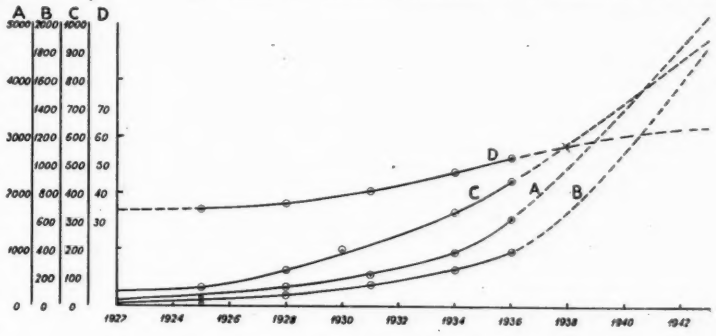
[Copies of the report are available from the joint secretaries, by whom it is signed on behalf of the Committee, Messrs. J. Harwood Fryer and A. White, 59, Old Bailey, London, E.C.4.]

The Trolley-bus. By E. T. Hippisley, M.A.

Present trends and probable future developments in Great Britain

THE operating costs of the most recent examples of trolley-buses and motor-buses in city service, where headways are short and stops close together, are closely comparable, and it would be unwise to claim that, under these conditions, large sums of money would be saved by the substitution of one type of vehicle for the other.

Differences in calculated costs arise mainly from variation in opinion regarding the provision to be made for renewal of vehicles, *i.e.*, the years of life which may be expected. The present method of assessing the life of trolley-buses and motor-buses at ten and eight years for loan purpose gives the motor-bus an advantage on paper to which it seems hardly entitled, since it is common practice to write off these vehicles, at any rate when employed on dense city service, in about six years. On the other hand, there are trolley-buses in regular service to-day of a greater age than ten years. Differences in running costs depend mainly on the price paid for power and the amount consumed by the vehicle. There is very little difference between the prices paid by various operators for petrol or Diesel fuel oil.



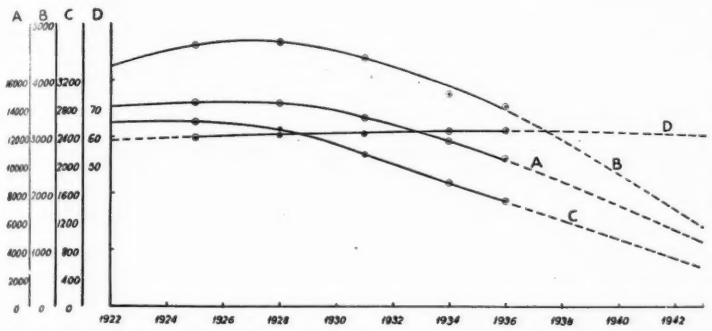


Fig. 1 (above) Trolley-buses in service. Fig. 2 (left) Tramcars
A. Number of vehicles. B. Million passenger journeys. C. Route miles. D. Seats per vehicle

Although the only reasonable method of comparing operating costs is the assumption of an entirely new system (and calculated costs are usually based on this assumption), the fact remains that the case for the trolley-bus gains materially by the existence of supply and route equipment for a tramway system. Estimates vary considerably as to the saving in capital expenditure on this account, but it is undoubtedly real and probably amounts to about 20 per cent. A further point is that, once route equipment has been dismantled, very real difficulty is met in attempting the introduction of trolley-buses. The cause of this is partly an unwillingness to reverse a decision already made and partly a desire to avoid capital expenditure on route equipment, even when it can be shown to be justified economically.

The "mobility" of the two types of vehicle has been compared, to the disadvantage of the trolley-bus. Once a service is established on a definite route, however, especially in the more central portions of a city, there is very little likelihood of abandonment or variation of route, even where motor-buses are employed. The most that can reasonably be argued from the differences between the types of vehicle is in favour of the use of motor buses for the purpose of building up a service in new districts; this is, indeed, normal practice, and conversion to trolley-bus operation often follows when the route is stabilised and suitable headways are possible.

Arguments regarding the use by trolley-buses of home-produced fuel have been countered by figures regarding the employment given in this country as a result of the distribution of imported oil. In Germany, however, there has been considerable development in battery-operated vehicles during recent years, and it has been stated in the Press recently that a commission has reported in favour of the extension of the use of trolley-buses.

What Results Show

There has been considerable propaganda on both sides, much of which is naturally suspect, and consequently it seems that judgment by results is the only safe method to adopt. The real criterion is the popularity of the trolley-bus. What is the extent of this, and is it waxing or waning? Popularity, for present purposes, will be judged by the changes from year to year in the following basic figures:—

(*a*) Growth of systems, as indicated by the number of vehicles in service, average number of seats per vehicle, number of passengers carried and number of route-miles operated.

(*b*) Density of service as indicated by the total number of seats provided per route-mile operated.

(*c*) Trend of tramcar replacement, as indicated by the percentage of withdrawn tramcars for which trolley-buses are substituted.

The graphs in figs. 1 and 2 relating to (*a*) cover the period 1922 to 1936 and have been extended to 1943 in the light of probable future developments. Graphs relating to (*b*) and (*c*) are given in fig. 3. Extending these as in the previous two cases, we find that in 1943 some 50 per cent. of the withdrawn tramcars will have been replaced by trolley-buses, when the density of service of the latter is equivalent to 350,000 seats per route-mile. These curves all indicate clearly that the popularity of the trolley-bus has risen steadily and is rising more rapidly to-day than at any previous time.

The next point is whether any steps can be taken to popularise the trolley-bus still further. There are some general directions in which operating costs can be reduced, which are applicable to trolley-buses and motor-buses alike. The first possibility is a reduction in deadweight per passenger seat. The building of chassis and body together as one unit, a method which has been used here for the lighter types of railway rolling stock and in America for buses, seems to be the most likely method of weight-saving without sacrificing necessary strength. Estimates of this saving vary considerably, but 15 per cent. is claimed in certain cases. Experimental vehicles of this type are at present being constructed in this country.

A second possibility lies in the consideration of the carrying capacity of the vehicle. Although it is customary to use double-deck vehicles in this country, advantages are claimed by operators of single-deck tramcars having a large overload capacity for standing passengers, such as quicker loading (resulting in faster schedules and a reduction in vehicles required) and a higher average proportion of useful to total weight per vehicle taken over a whole day's working.

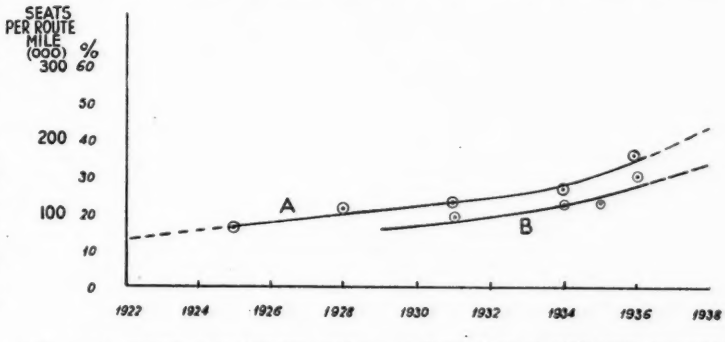


Fig. 3.—A. Density of trolley-bus service. B. Percentage of withdrawn tramcars replaced by trolley-buses (calculated from the total number of those withdrawn or replaced as compared with 1928)

As applied to buses the omission of an upper saloon would lead to the easing of restrictions regarding standing passengers, and, if the expected concession of additional width is realised, a single-deck vehicle could be produced which would carry a high standing overload and still give ease of entry and exit. This would, in fact, merely follow the trend of railway accommodation as provided for city service.

Turning to those steps which could be taken to improve the popularity of the trolley-bus only, one is immediately faced with the fact that the trolley-bus differs mainly from the motor-bus in its propelling equipment. Hence the field is narrowed to such improvements as can be made in the electrical equipment and transmission.

Cost of Energy

The principal consideration is the cost of energy per vehicle-mile. This depends on the price paid per kWh, on the line losses, and on the consumption at the vehicle. The average price paid for energy by provincial operators is about 0.75d. per kWh, varying between 0.6d. and 0.95d., or even more. In London it is about 0.5d. While it may not be generally practicable to go down to the latter figure, 0.65d. should be realisable, even by smaller operators. This figure has been taken as the basis of the table of comparative costs of operating petrol-, Diesel- and trolley-buses. For the first two the cost per 100 seat-miles remains constant at 27.3d. and 25.1d., but for the trolley-bus it varies considerably with headway. Thus its total operating cost is slightly more than that of the petrol-bus for a 12-min. headway, giving 250 seats per hr. each way, and does not fall below that of the Diesel-bus until the headway becomes 4.3 min., providing 700 seats per hr. each way. With a 1½-min. headway (2,000 seats per hr. each way) the total cost falls to 24d. per 100 seat-miles.

The number of kWh consumed per vehicle-mile is rising with increased speeds and weights and with the greater seating capacity of vehicles. For 60-seaters it approaches 2½ kWh per vehicle-mile at sub-station. In 1936 trolley-buses consumed

ESTIMATED OPERATING COSTS. 50-SEATER PASSENGER VEHICLES.

	Pence per Vehicle-mile.					
			Trolley-bus: headway.			
	Petrol-bus.	Diesel-bus.	1½ min.	3 min.	6 min.	12 min.
Traffic expenses	5.20	5.20	5.20	5.20	5.20	5.20
*General expenses	1.60	1.60	1.90	1.90	1.90	1.90
Fuel or power	2.60	1.20	1.30	1.30	1.30	1.30
Repairs, vehicles and buildings	2.25	2.35	1.50	1.50	1.50	1.50
„ route equipment ...	—	—	0.20	0.35	0.60	1.00
Total working cost ...	11.65	10.35	10.10	10.25	10.50	10.90
Financial expenses, vehicles and buildings	2.00	2.20	1.65	1.65	1.65	1.65
Financial expenses, route equipment	—	—	0.25	0.40	0.79	1.30
Total financial cost ...	2.00	2.20	1.90	2.05	2.35	2.95
Total operating cost ...	13.65	12.55	12.00	12.30	12.85	13.85
Assumed cost per vehicle ...	£1,700	£1,850	£2,000			
„ life „ ...	8 yr.	8 yr.	10 yr.			
„ cost of fuel per gal. or power per kWh ...	1/1¾	1/0¼	0.65d.			
Interest and depreciation ...	3¼%	3¼%	3¼%			

* Includes 0.55d. licences and, for the trolley-bus only, 0.30d. local rates.

approximately 100 million kWh and tramcars about 750 million kWh, and in order to retain this load supply engineers should make every effort to influence decisions regarding the type of vehicle to be adopted in place of the tramcar.

The use of mercury rectifiers should lead to lower power costs due to reduction in attention required compared with rotating machinery and better utilisation of power owing to the possibility of using more sub-stations of lower unit capacity and consequent reduction in line losses. One operator who generates his own electricity estimates that the saving in cost of power is of the order of 10 per cent. in wages alone.

Turning to the savings which may be effected at the vehicle, apart from those obtainable by reduction in its dead weight, the first economy which comes to mind is the use of regenerative equipment. Equipment of this kind is already in common use, but not all operators are persuaded of its advantages, except for service in hilly districts. These advantages include a definite saving in energy which results from regeneration of current which is absorbed by other vehicles, maintenance of better average line voltage, and an energy consumption that is less dependent on good driving. Although regeneration has associated problems, in regard to sub-station equipment these can be solved without excessive expenditure. In addition, saving in brake-lining wear results from the use of an electric brake.

Apart from regeneration, there appear to be only two principal ways in which saving can be made. One way is by reducing the dead weight of equipment. Little saving can be made as regards control apparatus except by the omission of special features which may not be of universal utility. Low-voltage lighting is an excellent feature which has come to stay; experimental work is now being carried out in dispensing with a separate motor, by reverting to the practice of driving the dynamo direct from the traction motor, as was formerly done with smaller machines supplying only the legal lights. With regard to battery manœuvring—running the vehicle at low speeds for short distances from a lighting battery of about double the normal size—the opinion of the majority of provincial operators appears to be that the additional cost and dead weight are unjustifiable for their conditions of service. In general, these operators find no difficulty in securing adequate space for turning at route termini or at intermediate points. As regards the traction motors, dead weight can be saved if higher propeller-shaft speeds and greater gear reductions can be made available.

The second way is by reducing the energy consumption of the motor. Progress may be made in this direction in two ways: (1) Modification of characteristics so as to reduce rheostatic losses, and (2) adapting the characteristics more closely to type of service operated. With regard to (1), it would be necessary to design motors to have an even wider range of field control than at present, so that the present maximum vehicle speeds could be maintained in association with lower vehicle speeds on full field. This seems to involve also the provision of greater gear reductions if an increase in weight is to be avoided. Regarding (2), the attainment of the conditions of (1) could be used to secure greater economy in energy by providing two or more values of the weakest field strength, corresponding to the type of service, *e.g.*, the distance between stops.

The maximum speed obtainable on the greatest of these weak field strengths would be, say, 25 m.p.h. and would not appreciably reduce the schedule speed obtainable where there are many (*e.g.*, eight to ten) stops per mile, and high speeds between stops are impossible. An intermediate strength might be employed for five to six stops per mile, and a weakest field strength giving a balancing speed of, say, 40 m.p.h. might be available for use in outlying areas where the stops are so infrequent that 30 m.p.h. could be reached between stops. It should be possible by such methods to reduce energy consumption from 2½ to 2 kWh or less per mile at sub-station.

Current Collectors

It has been said with a considerable amount of truth that the disadvantages of the trolley-bus are mainly outside the vehicle itself. The reference is, of course, to the method of power supply to the vehicle through trolley collectors. Any steps which can be taken to decrease de-wirements will reduce both operating costs and inconvenience to the travelling public. De-wirements tend to be greater than with tramcars, since the relative positions of the vehicle and the trolley wires are not constant.

To minimise this risk special care is necessary in the alignment of the overhead work. The trolley wheel has never been considered the perfect collector, and the use of sliders is not new; there are, however, problems yet to be solved before the latter can be said to have ceased to be experimental. The majority of provincial operators use wheels, and some report a reduction in de-wirements to as few as three per 10,000 miles, and it would therefore appear that the construction and maintenance of the overhead work to first-class standards is capable in itself of producing results which may be considered entirely satisfactory; it is clear, however, that something better than the standard formerly associated with most tramway systems is necessary.

To sum up, the present trend appears to indicate a considerable increase in the near future in the use of this type of vehicle, provided that a power supply is available at a reasonable price. There is still scope for improvement both in the vehicle itself and its equipment and in the manner in which the power supply is brought to it, but the trolley-bus is the most comfortable form of passenger road transport for city service, for which its operating costs are as little as or less than those of other vehicles.

I am indebted to the general managers of the following undertakings for certain information included in this article and in the table of average operating costs: Birmingham, Derby, Grimsby, Huddersfield, Mexborough and Swinton, Newcastle, St. Helens, Southend, and South Shields.

High-voltage Fuses

A handbook of 56 pages and including 31 figs., entitled "New Fuse Efficiency and Economy Manual," by R. C. Andersen an dK. Dannenberg, has been published by Electric Transmission, Ltd. This is intended to draw attention to the merits of "Eetee" high-voltage fuse, but while doing so it gives technical information of a more general character that should make it useful to engineers interested in problems of circuit interruption.

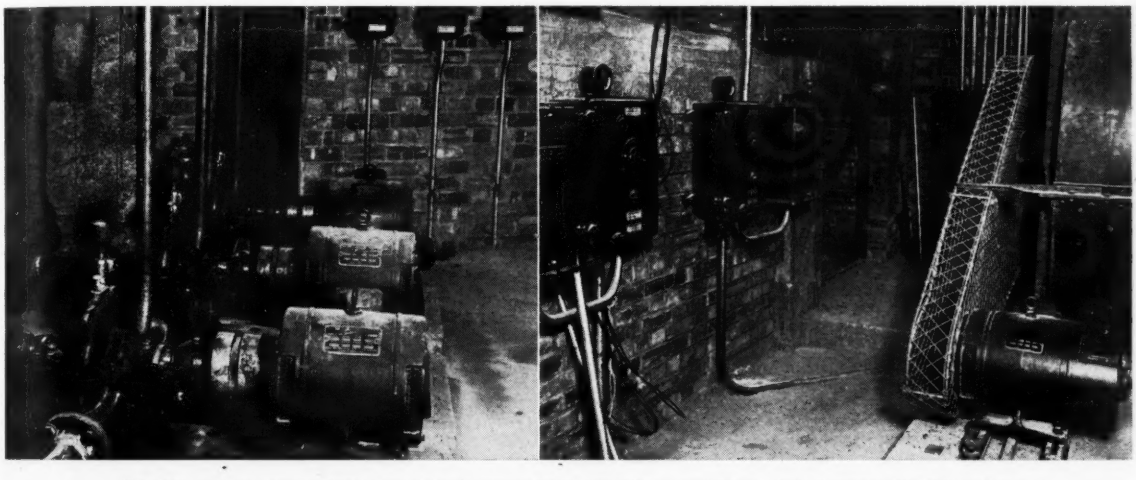
The Queen's Hotel, Leeds

A complete air-conditioning installation

THE position of the London, Midland and Scottish Railway Co.'s new Queen's Hotel, Leeds, between City Square and the Wellington and New Stations has rendered it necessary to take special precautions to exclude noise and dirt. As a result the building, which was opened last Friday, has the distinction of being one of the first hotels in the country to possess an air-conditioning installation covering every room.

Costing approximately £500,000, the new hotel contains a banqueting hall seating 400-500, a smaller banqueting hall, grill room, French restaurant, brasserie, private dining rooms, lounge, writing room, American bar, and 200 bedrooms, each with its own bathroom. The air to the bedrooms is supplied near the floor and extracted at high level on the opposite side. The extracted air passes into the bathroom whence it is exhausted to the roof through large shafts containing all plumbing and service pipes. The distribution of air to the public rooms is generally on the mixed system, part upward and part downward, provision being made for adjusting the proportions extracted at high and low level.

The air-conditioning plant for the whole building, together with the boilers, pumps and other mechanical equipment, is situated in the Goyt, a disused river conduit at the rear of the hotel below basement floor level. The fresh air is drawn into this chamber from a low roof level at the second floor to seven inlet ventilating plants serving the various rooms, the total volume of air delivered being 10,250,000 cu. ft. per hour. Each of the plants (with the exception of that for the kitchens) comprises a self-cleaning oil-coated air filter, fabric filter, preheater, air washer having concrete casing and glass eliminator plates, main heater and fan. Provision is made for cooling the washer water by refrigeration at a future date. The heaters are thermostatically controlled electrically by means of apparatus supplied by Thermocontrol Installations, Ltd., and in some cases are sectionalised to serve individual rooms at different temperatures if required. The plant for the kitchens has no washer or fabric filters.



Washer pumps and extract fan driven respectively by 3-h.p. and 9-h.p. Bull "Super Silent" motors

Each plant has its own separate extract fan so arranged that the exhausted air can be used in part for the kitchen supply. The bathroom extract fans are on the roof discharging direct to atmosphere, and are arranged with duplicate motors. Further extract fans are provided in the Goyt for basement lavatories, also with duplicate motors. The kitchen and services naturally have a separate extract system.

The fans are driven by 3-phase, slip-ring variable-speed motors, with Allen West starters, all of which are hand-operated excepting those on the roof which are push-button controlled from the Goyt. Inlet and extract fans are in many cases controlled from one starter, both fans having speed regulation operated sympathetically. The fans were supplied by Matthews & Yates, Ltd., air filters by the Visco Engineering Co., Ltd., washer pumps by the Pulsometer Engineering Co., Ltd., thermostatic valves by the Rheostatic Co., Ltd., and rolling shutters, for cutting off the air flow when plants are shut down, by Mather & Platt, Ltd. The whole of the ductwork was by Gardners.

Direct hot water heating is provided in public rooms and bedrooms by flush steel wall panels, cast-iron radiators being used on staircases, &c. To supply coke for the boilers seven conveyors are provided. Four are of rubber belt-type the remainder being a compact new type of flap-conveyor requiring no plough or similar device. The coke-handling plant was made by Spencer (Melksham), Ltd.

The hot water supply comes from three copper calorifiers, with storage cylinders above, giving a total storage of 10,000 gal. Both primary and secondary circuits are accelerated by duplicate centrifugal pumps. For the cold water supply booster pumps are provided for periods when the standing pressure is not sufficient to reach the top of the building. These and other pumps used are of Pulsometer make.

The heating and air-conditioning has been carried out by G. N. Haden & Sons to the design of Dr. Oscar Faber in collaboration with the L.M.S. Hotel Controller's Department. Over seventy Bull "Super Silent" motors are used for the fans, pumps, conveyors, &c. The starters used were manufactured by Allen West, and are all air-break fitted with time lags and coil-wound overloads.

Indirect shadowless lighting has been adopted to a large extent and an intensity of between 10 and 15 ft.-candles has been obtained in most cases with a consumption of between 2 and 3 W per sq. foot. This consumption does not include purely decorative effects, and the considerable variation is due to the fact that ceilings in some cases are darker than others. Throughout the rooms the ceilings are pale fawn and are by no means ideal for this type of lighting. Allom Bros., Ltd., were responsible for the whole of the lighting of the public rooms.

The main illumination of the reception hall and the adjoining grill room, lounge and the American bar is mostly from pendants, but in the centre of the lounge are two ventilating shafts, on the top of which are fixed decorative luminous glass bowls containing indirect lighting reflectors. The French restaurant is lighted by a centre pendant and a luminous glass cornice with cornice lighting reflectors. This cornice is of particular interest in that the lighting of the glass is accomplished by the same lamps which light the ceiling and which are spaced at 2 ft. centres. The lighting of the glass is on the same principle as the "Internalite" signs, and in order to screen the view of the cornice reflectors, the glass itself is backed with metal, and the decorative effect is obtained by sandblasting on the back of the glass.

On the first floor the ballroom and entrance vestibule are lighted from pendants, but in the private banqueting hall reflectors have been fixed in two small recesses over the cornice in each wall with excellent results. In the basement there is a large brasserie and snack bar lighted with luminous glass wall brackets. Fittings for the bedrooms and kitchens were manufactured by Holroyd (Glassware), Ltd. The public rooms together have a lighting load of about 40 kW.

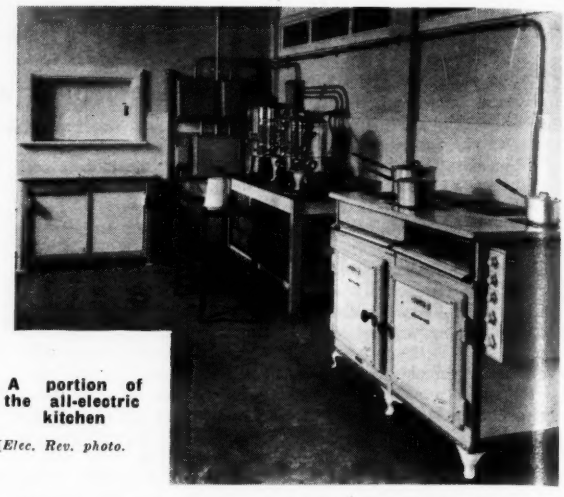
Neon tubing for signs and for outlining of the canopies in gold helium have been supplied by Boro' Electric Signs, while the flagstaffs and the two staircases on the front of the hotel have been floodlighted by G.E.C. equipment.

Fourteen electric lifts are provided. The main passenger lifts and the service and small service lifts have been supplied by Waygood-Otis, Ltd., and the banqueting hall units by J. & E. Hall, Ltd. The goods and staff lifts were made by Keighley, Ltd. A complete vacuum cleaning system capable

Dagenham Civic Centre

THE numerous municipal buildings now being erected are providing exceptional opportunities for introducing new electrical ideas. It is especially with regard to illumination and electric heating that the new civic buildings just completed at Dagenham at a cost of over £100,000 are of interest. Due largely to novel lighting effects the entrance hall and the Council Chamber are probably the most striking features. Three star-like semi-indirect fittings with peach glass have been specially designed by the architect, Mr. E. Berry Webber, to harmonise with an original colour scheme used for the entrance hall ceiling. Round these is a continuous border of lamps hidden behind similarly tinted glass, additional lighting coming from semi-indirect ceiling fittings round the adjoining balcony.

The marble wall surrounding the entrance to the Council Chamber is fluted, three floodlights let flush into the base at each side giving a pleasing light and shade effect. In the Council Chamber itself the main illumination is provided by ten "port-hole" fittings mounted on the edge of the balcony, as is commonly done nowadays for electric stage lighting.



A portion of the all-electric kitchen [*Elec. Rev. photo.*

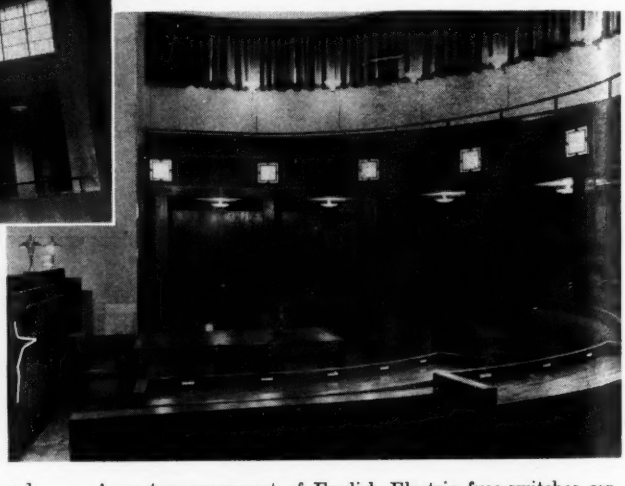
Attractive illumination effects in the entrance hall and Council Chamber [*Elec. Rev. photos.*

Twelve bracket fittings have been installed round the gallery walls, and there are also ceiling units underneath the gallery. Ceiling coves provide two long strips of concealed lighting above the chairman's dais, the canopy of which contains a striplamp. Red and green lights are used to indicate to speakers when their allotted time has been reached.

Totally enclosed fittings are used largely in the general office buildings, special reflector units, however, being fitted in the drawing offices. In the chairman's room two pedestal fittings give a pleasing contrast to the indirect ceiling fittings. C. Harvey & Co. manufactured all the lighting fittings. Outside the building and close to an ornamental lake are two large standards fitted with 150-W Philips sodium lamps.

A small air-conditioning system is provided for the Council Chamber, and extract fans ensuring adequate ventilation for all rooms are arranged at each end of the building. They are operated by Bull "Super Silent" motors with Crabtree starters, an Airedale circuit-breaker isolating the supply from the mains. Bull motors fitted with Allen West starters are also used for the hot-water circulating pumps. Hot water for the kitchens, lavatories and caretaker's flat is provided by 20- or 30-gal. G.E.C. heaters.

Altogether the electrical loading of the kitchens is nearly 50 kW, the equipment (all Jackson) comprising a cooker (26¼ kW), hot cupboard (4 kW), vegetable boiler (3 kW), an 8-gal. water boiler (4 kW), and 2-gal. milk and coffee boilers (1½ kW each). A water boiler is installed in a service room near the Council Chamber.



A neat arrangement of English Electric fuse-switches controls the electricity supply from the main switchroom; the intake box was supplied by W. Lucy & Co. Separate boards deal with the water heating supplies and Simplex ironclad switchgear is used in the kitchen. Crabtree switches and M.K. sockets have been employed throughout the building. An electric clock installation has been supplied by the Synchromatic Time Recording Co., and a 10-passenger lift by J. & E. Hall. The electrical contractors were Grierson, Ltd.

The Queen's Hotel, Leeds (*Continued from previous page*)

of operating ten cleaners at once has been installed by the Lamson Engineering Co., Ltd. There are no bells in the rooms, G.E.C. automatic telephones being used entirely for calling purposes. Gent & Co. supplied the electric clocks.

Electricity has been called into service extensively for the preparation of food, the Lancashire Dynamo & Crypto Co. having supplied a coffee mill, a vegetable peeling machine, an automatic potato chipper, &c. Refrigeration equipment has been installed by the Lightfoot Refrigeration Co., Ltd., and J. & E. Hall have provided an ice-cream making plant.

To cater for the total load of over 1,000 kVA (including about 200 kVA for the station lighting) two separate supplies of electricity taken from the Leeds Corporation at 400 V, 3-phase, 4-wire, 50 cycles are brought to the switchroom by eight armoured cables, four for each supply, and one from the Corporation sub-station, along the Goyt wall to a combined switchroom for the hotel, station and offices. The main switchgear comprises eight cubicles with 1,000-A circuit-breakers. The switches for the normal and emergency lighting are interlocked and have automatic change-over features. All switches have overload and no-volt releases.

On each side of these cubicles are four banks of switches (W. Lucy & Co.) controlling the various lighting and power circuits. They are of the totally enclosed air-break type. By an arrangement of links on the bus-bars any section of the switchgear can be isolated. Local distribution boards (English Electric) have selecting devices for balancing purposes.

Altogether sixty-one miles of cables have been used. The main cables are of Callender's fibre insulated type with single-wire armouring, and all small wires for the sub-circuits were manufactured by W. T. Glover & Co., Ltd. The lighting circuit is in the form of a ring main through the building.

Thirty-one miles of conduits (Walsall) are used and the tumbler switches are J. H. Tucker & Co.'s silent type with short slow-break movement. The switch plates are coloured cream. M.K. wall sockets have been employed. The whole of the electrical installation was carried out by Rashleigh Phipps & Co., Ltd.

French Railway Electrification

Rapid advance in recent years

SINCE 1934, when the Paris-Orléans and Midi railways were amalgamated, their conversion to electric traction has been under common direction. How this work has progressed is described in a paper by Monsieur A. Bachellery, which was read at the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 18th.

In 1923, when the author read his previous paper in London, electric traction was in operation only on the suburban section of the Paris-Orléans Railway (26 km. 600 V d.c. third-rail system) and on 280 km. of the Midi Railway (55 km. 850 V d.c. third-rail; 46 km. 12,000 V single-phase; and 179 km. standard 1,500 V d.c.). In the intervening period developments have been rapid, and at present there are 2,518 km. of electrified lines on the Paris-Orléans and Midi railways, comprising 5,524 km. of track.

The new permanent-way equipments are of the overhead 1,500 V d.c. type. The suburban section of the Paris-Orléans railway has been re-equipped on the standard system. Electrification covers nearly the whole of the mountain lines in the Pyrenees, including the two Transpyrenean routes where there are gradients of over 1 in 25. But it has been mainly pursued of recent years on heavy-traffic lines where a high consumption of coal per kilometre of route allows sufficient economy to make electrification a paying proposition. Construction has been begun between Tours and Bordeaux, and next year, when this has been completed, electric locomotives will be able to run without interruption from Paris to Irun, on the Spanish frontier, a distance of 820 km. Electrification at present covers 22 per cent. of the whole system, and handles 50 per cent. of the traffic; 30 and 70 per cent. respectively are aimed at.

Monsieur A. Bachellery in an I.E.E. paper shows that "audacious" expenditure has proved a profitable investment

Consumption of electrical energy by the railways amounted in 1936 to 470 million kWh, corresponding to an economy of coal on the locomotives of more than a million tons. This energy is mainly produced in hydro-electric plants belonging to the railways or to allied concerns. A part, however, is drawn from steam plants connected to the railways' h.v. lines. The Orléans Co. owns in Central France two water-power plants with a capacity of 152,000 kW. The Midi Co. owns seven water-power plants in the Pyrenees, with a total installed capacity of 135,000 kW. Their average annual production is over 900 million kWh and the surplus energy is sold for use in industry.

Standard 3-phase 50-cycle generation allows interconnection with the public distribution systems. The Orléans 90-kV and 220-kV lines run north to Paris, and the Midi system comprises 60-kV and 150-kV lines; 36 generating plants, either water-power or steam, are connected to it and run in parallel. With an annual output of 2,000 million kWh these plants provide practically all the electricity in the south-west of France; 150 kV or 220 kV is used for long-distance transmission and 60-kV or 90-kV lines run along the railway to the sub-stations. There are 422 km. of 220-kV lines, 805 km. of 150-kV, 1,220 km. of 90-kV, and 1,614 km. of 60-kV, making a total of over 4,000 km.

All the recently constructed h.v. lines employ steel-reiniforced aluminium cable carried by suspension insulators. Interconnection transformer stations, of which there are ten in service, total 720,000 kVA. Most of them are provided with synchronous condensers for voltage regulation. The total reactive kVA of these machines is 267,000. One of them, installed in 1933 at Portet St. Simon on the Midi railway, is of the outdoor hydrogen-ventilated type and is rated at 30,000 kVAr. It is, the author believes, the only machine of its type in Europe, and it gives entire satisfaction.

Sub-stations

There are at present 111 converting sub-stations, with an installed capacity of 357,000 kW. The rotary convertors are, for the most part, groups of two 750-V units connected in series, compound, 2,000 kW.

A great number of new sub-stations has also been equipped with rectifiers. Instead of 12-phase double-unit groups, 6-phase 2,000-kW single units are now used. Induction on telephone lines through the slight ripple of the current is prevented by appropriate filters. Polarised anode grids have been inserted for protection against arcing. Excited grids for regulation of d.c. voltage, in order to obtain a compound characteristic, have not yet yielded definite results.

Automatic control of 60 sub-stations is only applied to the convertors and d.c. feeders. The connections between sub-stations and high-voltage lines are always made manually. The overhead-line equipment is of the compound catenary type, differing slightly in detail on the two systems.

Locomotives and Motor Coaches

The Paris-Orléans and Midi system is in possession of 638 electric locomotives and 152 motor-coaches. The 102 high-speed passenger locomotives have mostly four independent driving axles mounted in the main frame, with a guiding bogie at each end. The motors are entirely spring-borne, horizontal, and mostly of the twin-armature type permanently coupled in series.

The hourly rating is 3,900-4,800 h.p. Transmission between the motors and the axles is obtained through plain gears, according to either the Buchli or a quill-drive design. The motor control is electro-pneumatically operated. Some, designed to take express trains down long 1 per cent. grades, are arranged for regenerative braking, which has proved quite successful at speeds varying from 25 to 140 km. per hour. When regenerating, the motors are separately excited at variable voltage by a special motor-generator set. The majority (521) have two 4-wheel driving bogies; their hourly rating varies from 1,400 to 1,800 h.p., and all have nose-suspended geared motors, wound for the full 1,500 V.

Three different methods of coupling the motors enable them to draw either passenger or freight trains. At speeds over 80 km. per hour this type requires special devices to prevent "nosing." On the Midi locomotives this trouble is prevented by coupling the bogies together with a drawbar and buffers, and on some of the Paris-Orléans locomotives which have independent bogies a flexible coupling device has been added between these.

The Midi engines of this type are largely in service on grades steeper than 1 in 50, and are therefore fitted with an electric brake of either the rheostatic or the regenerative type. Freight trains are now equipped with continuous braking, and regeneration is practised on all kinds of trains on the steep down grades. In addition, all locomotives have an automatic air brake and a direct, adjustable air brake.

The 15 shunting engines are mostly old two-bogie locomotives built for suburban service on 600-V d.c. The original motors have been kept, but the control apparatus has been replaced by a convertor group operating on the "Metadyne" system, which transforms the 1,500-V line current into variable-voltage current for speed regulation. These locomotives have proved very efficient and economical.

The motor-coaches are mainly used for suburban service in the Paris district. They are two-bogie cars with four nose-suspended geared motors, coupled two in series. The hourly rating varies from 700 to 1,000 h.p., the weight from 56 to 74 tons, and the maximum speed from 90 to 100 km. per hour. Each motor-coach has 82 passenger seats. Trains are made up from two or three groups of one motor-coach and two trailers each, operated by multiple-unit control. The passenger trains are heated electrically; 4,010 coaches are already fitted with 1,500-V radiators under the seats.

The Achievements

Electrification has improved service on mountain routes and has removed the smoke nuisance in long tunnels and at the underground terminal of the Paris-Orléans line in Paris. The heavy Paris suburban traffic could not have been handled without the facilities afforded by electric multiple-unit reversible trains. Even on ordinary main lines the advantages are most impressive.

The weight of fast passenger trains on the French railways is continually going up and their speed must also be raised to meet the severe competition with road transport. While the continuous rating of the most modern passenger steam locomotives does not in practice exceed 2,500 h.p. on the drawbar, and it is only with great difficulty that the average fireman can stand the physical strain which this represents, the performance of the high-speed electric locomotive is easily 50 per cent. higher, permitting great acceleration of heavy passenger trains. Between Orléans and Tours, for instance, several trains now maintain a schedule speed of 110 km. per hour. Similarly, on the 500 km. from Paris to Brive, with long grades of 1 in 100, the express-train time has been cut down by more than an hour. Heavy goods trains have also been accelerated by the use of electric locomotives.

(Continued at foot of next page.)

Meetings and Discussions

Public Works Congress
Special Industrial Lighting
Automatic Telephony

At the Public Works, Roads and Transport Congress this week the subjects discussed included public lighting, aerodrome lighting and sewage pumping. The design of fittings for use in special industrial situations was dealt with by Messrs. W. R. Stephens and S. Anderson at a joint meeting of the A.S.E.E. and the Illuminating Engineering Society on Tuesday last. The operation of the batteries in automatic telephone systems received attention in a paper read before the A.M.E.E. at Cardiff recently.

Electricity in Public Works

DIFFERENT aspects of the utilisation of electricity in connection with public works are mentioned in several of the 27 papers submitted at the ninth Public Works, Roads and Transport Congress and Exhibition in London this week. In one of them Mr. C. H. Woodward (borough electrical and public lighting engineer, Bournemouth) stresses the need for photometry in public lighting. His paper describes several types of instruments, visual comparison, direct reading and total output types, and equipment for the establishment of a photometric routine.

The keeping of records and checking compliance with a contract are discussed, while it is pointed out that a photometrist constitutes an obstruction on the highway. As such, he must himself be lighted and protected while carrying out his laborious task in the road. The author further describes two time-saving contrivances which he has devised. He concludes that, if a serious attempt is to be made to improve roadway illumination, public lighting departments will have to make increasing use of photometry.

The construction of municipal aerodromes is dealt with in a paper by Mr. H. R. Reynolds (surveyor to the divisional engineer, G.W.R., Oswestry). As night flying is increasing the author points out that it is necessary to provide a neon beacon of 3 kW to indicate to pilots, by flashing the code signal of the particular aerodrome, the proximity of the landing field. The most suitable position for such a beacon is on top of the main aerodrome building itself, although it might be erected on an adjacent trellis tower about 35 ft. high.

Boundary lights may be of the stalk or cone types and should be fixed at 300 ft. intervals around the perimeter of the aerodrome so as to indicate to pilots the size and shape of the landing area. For illuminating the landing "lanes" four 9-kW ten-lamp floodlights suffice for an aerodrome of 300 acres. One should be placed at the centre of each side of the field on structures about 4 ft. high if the ground does not slope. These floodlights should be remotely controlled, so that the control tower officer can immediately change over from one to another by means of switches positioned directly under his hand.

Two-lamp obstruction lights mounted on trellis steel masts are necessary to warn pilots of buildings and hangers. An illuminated wind-direction indicator must be provided and fitted with an automatic device to return it to a predetermined position under "no wind" conditions. Aerodromes which are likely to be affected by fog need radio "blind landing" equipment, and the author favours the Lorenz system. For an aerodrome of 300 acres the ground lighting equipment and signalling apparatus would cost £1,000.

In discussing the design of sewage and storm-water pumping stations, Messrs. E. V. Bevan and B. T. Rees (borough engineer's department, Swansea) declare that the convenience of electric motor drives often far outweighs all other considerations. When power is not generated on site the use of motors permits the pumping station to be as small as possible, while they can be switched remotely, which simplifies float control. Electrical gear requires the minimum of attention and is the most reliable of all. The lower building cost and maintenance are also strong factors in deciding upon an electrical pumping station.

The motors should be capable of starting against at least 50 per cent. of full load torque. In the presence of corrosive or inflammable gases either totally enclosed or flame-proof machines should be used, although a drip-proof type will suit most pumping stations. When the duty is not definitely known a continuous rating should be specified.

The cheapest and simplest is the squirrel-cage induction motor. It is easily controlled, there are no slip rings or brush gear to maintain, but its starting current is heavy and starting torque is low. Next in order is the wound rotor or slip-ring induction motor, with its more costly switchgear. Its brushes need renewal, but it is easily controlled, has a high torque and lower starting current. The most expensive is the synchronous motor, which has a constant speed, low starting torque, complicated and expensive control gear and high initial cost for automatic working; but a strong case can be made out for this type when the price of electricity is based on power factor.

In dealing with practical aspects of housing design for working-class dwellings costing from £359 to £660 Mr. B. Price Davies (city engineer, Bangor, N. Wales) includes a comparative table of trade costs which shows the electrician's charges to be from £9 to £12 or about 2.5 per cent. of the total.

Special Purpose Lighting

INDUSTRIAL illumination for which non-standard fittings are necessary is dealt with in a paper by Messrs. W. R. Stevens and S. Anderson (G.E.C.) which was read in London on November 16th at a joint meeting of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS and the Industrial Lighting Section of the ILLUMINATING ENGINEERING SOCIETY.

For situations where explosive or inflammable materials are used the authors maintain that so-called dust-tight and water-tight fittings are little better than ordinary open or enclosed types. They suggest instead that large areas may be floodlighted from outside through windows in the roof or side walls. Owing to the high mounting and losses associated with projection through the glazing, the coefficient of utilisation tends to be low.

Non-flameproof fittings may be employed just outside a partially enclosed dangerous area when an extraction system is provided to draw dangerous vapour away from the open side when the fittings are installed. Flameproof fittings are the only possible type in some situations. It is practicable to make a fitting which, though not perfectly sealed against the ingress of inflammable vapours, is sufficiently robust to withstand internal explosion and to prevent the passage of a flame to the outside. All joints are constructed in the form of large flanges with machined surfaces and separated by an air gap of the order of 0.01 in. For comparatively low wattage lamps, the heat generated can be dissipated sufficiently rapidly to avoid a dangerous temperature rise on the outside of the fitting without making it unduly cumbersome.

Experiments recently carried out at the Buxton testing station have shown that cold cathode electric discharge tubes can be broken in a methane-laden atmosphere without risk of ignition.

French Railway Electrification (*Continued from previous page*)

But for electric traction it would have been necessary to lay two extra tracks throughout the entire length of the 123-km. section between Paris and Orléans, through which the whole of the traffic of the Paris-Orléans and Midi system in and out of Paris has to pass. On account of the facilities afforded by electrification the four-track construction has been limited to the 60-km. suburban section.

The Paris-Orléans and Midi companies have spent up to now on electrification work 3,730 million francs; 595 millions on generating plant, 2,060 millions on transmission and distribution and on permanent-way equipment, and 1,075 millions on locomotives and other rolling stock. This large financial outlay is offset by the economies obtained from electric traction. The reduction of operating costs has been fully confirmed. The average economy of coal on these companies' electrified lines is roughly 400 metric tons per kilometre of route, which is generally admitted to warrant the cost of electrically equipping the permanent-way. Moreover, electric locomotives can be used more continuously than steam locomotives, and consequently only about half as many are required for the same volume of traffic. The maintenance of electric locomotives is also much easier and cheaper; the distance they cover between overhauls is nearly double that of steam locomotives. The total reduction in operating expenses (including the cost of energy) for 1936 on the Paris-Orléans and Midi system due to electric traction is about 125 million francs, representing approximately 7 per cent. of the capital invested in permanent-way electrical equipment. As a consequence the ratio of expenses to receipts is lower on the Paris-Orléans and Midi systems than on any other French railway. Capital spent on electrification that has in the past been criticised for its audacity has proved to be a profitable investment.

Fittings not required to have elaborate optical systems for the redistribution of light can often be made with a porcelain top to hold a screw neck flashed opal globe. A rubber gasket between the top and the globe renders the whole fitting watertight and satisfactory for use in any corrosive atmosphere. The opal globe can be replaced by a vitreous enamel overreflector and a clear wellglass which gives better light control.

One of the most satisfactory specular reflectors is silvered glass with a protective backing of copper and then with lead. The canopy and lampholder are made of porcelain. Anodically oxidised and polished aluminium can be used as a specular reflector where the corrosive attack is not great, but it is doubtful whether it is so durable as properly silvered glass. Rhodium plating is very resistant, but somewhat expensive.

Apart from porcelain, reflector housings must be protected by painting and galvanising. Good stainless steel in a highly polished condition is one of the most resistant of metals. Copper and brass do not corrode as rapidly as would be judged from their rate of discoloration. Both resist the attack of acids, but not of alkalis, copper being better than brass. Lead-coated steel will resist most types of corrosive attack. Aluminium and its alloys will corrode in marine or bad industrial atmospheres. Anodic oxidation increases the resistance of these metals, but does not make them completely immune. The use of dissimilar metals in close contact can produce electrolytic action so severe as to accelerate considerably the corrosive effect of the atmosphere.

There are many industrial purposes for which differences in colour which are difficult to detect in normal artificial light must be rendered more obvious. The method of obtaining a colour-matching light from tungsten lamps by means of glass filters or specially coloured reflectors, though widely employed, is not completely satisfactory. The changes in the colour of the light emitted by the lamp during ageing and due to quite normal voltage fluctuations cannot be allowed for. For the most critical colour-matching work the best source is a cold cathode carbon-dioxide discharge lamp, although its efficiency is low.

Critical control of the gas pressure is essential for colour constancy, and is obtained automatically by means of a Moore valve operated by a solenoid connected in series with the supply to the tube. A fall in pressure causes an increase in the current flowing, raises an armature and exposes the tip of a porous carbon cone normally immersed in mercury and through which fresh carbon dioxide is admitted until the normal current flows, when the cone is again covered. Mains voltage fluctuations affect the intensity but not the colour composition.

About 34 ft. of 45 mm. diameter tubing in grid form in a rectangular sheet steel reflector 4 ft. by 3 ft. and enamelled white inside produces an intensity of between 35 and 40 ft.-candles, which involves a consumption of about 1½ kWh per hour, corresponding to an efficiency of approximately 2 lumens per watt. While this is admittedly a low efficiency, it compares favourably with that obtained by the use of a 500-W tungsten lamp unit employing the Lamplough double glass filter. Discharge tube installations of this type are in use in paper mills, a leather cloth factory, dye works, a fur factory, and a cloth warehouse, in addition to hosiery mills.

The great and increasing importance of accuracy in the large-scale manufacture of machines of which uniformity of performance and interchangeability of parts is demanded has given rise to a somewhat novel set of illumination requirements for the room in which master patterns and reproductions are compared.

High-voltage fluorescent discharge tubes possess several advantages for standards room lighting. They can be applied direct to the white ceiling without any extra reflector or diffusing medium, and the light is excellently diffused, comparatively shadowless and of even intensity. Two (white) mercury-filled tubes and one (pink) neon-filled tube prove satisfactory for the reading of fine micrometer graduations. Colour and intensity constancy is achieved by providing a tapped choke in series with the primary of the transformer feeding the mercury-filled tubes, these being underrun initially and brought up by alteration of choke tappings at intervals during life. The total wattage necessary for a given intensity on the working plane is only about half that necessary with tungsten lamps in suitable diffusing fittings or laylights.

The intensity provided varies between 16 and 28 ft.-candles in different installations, and though the initial cost is high the advantages outweigh considerations of capital cost in view of the extremely important and exacting nature of the work. The length of tube visible between electrode boxes is about 8 ft. 6 in. and each triple tube unit absorbs approximately 130 W. Transformers and tapped chokes are situated on the roof of the room and the low-voltage supply is usually arranged on a three-phase system, each phase being separately switched. Stroboscopic effects are thus reduced.

For the inspection of polished surfaces the lighting must be carefully controlled in direction, and the arrangement and design of the light source is generally more important than the type of illuminant employed.

Lamp columns by Concrete Utilities, Ltd., at Prince's Way, Norbreck, Blackpool. This new promenade and another—North Parade, Thornton Cleveleys—were opened by the Duke of Kent recently

Telephone Batteries.—Automatic telephony was the subject of a paper by Mr. J. C. George which was read before the South Wales branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS at Cardiff on November 13th. The author stated that of the world's automatic telephones 80 per cent. were "Strowger," which system had been standardised by the British Post Office. In general practice the energy for the system was supplied in the case of large installations by a single 52-V battery, and twenty-three of the cells were floated normally across the generator or generators. In some cases three machines were supplied, each having a different output and so arranged that the most economic and efficient running of the plant could be obtained under all conditions of load. An automatic field regulator maintained the individual cells at 2.15 V and kept the generator voltage constant, despite fluctuations in voltage and frequency of the supply mains. The full complement of twenty-six cells was only used in the event of the failure of the mains supply, or when the night load was very small and it was not considered economical to run a generator. The capacity of the battery should be at least five times the busy-hour load and would thus run the exchange for about fifteen hours in the event of the mains supply failing. Both Government and independent systems indicated that networks of "Strowger" equipment operating 14,000 to 30,000 lines were adequately maintained on a basis of 1.5 to 2 employés per 1,000 lines.

The Steam Turbine.—Steam turbine development was outlined in a lecture which Mr. H. L. Guy (chief mechanical engineer, Metropolitan-Vickers Electrical Co., Ltd.) delivered to the BELFAST ASSOCIATION OF ENGINEERS on November 17th. He pointed out that in thirty years the thermal efficiency had been increased by about five times, and there was no indication at present that the limit of possible and practical efficiency had yet been reached. Such extraordinary elasticity of performance by progressive development had not been approached by any other system of power generation. At the ruling rates of change, the capacity of individual sets should be doubled at intervals of about six or seven years. Progressive increases in the size had in turn made possible inherent increase in turbine efficiency and increased economy of materials as indicated by the weight of plant per kW of capacity. Limits to regenerative feed heating and flue gas or steam reheating were discussed, together with methods which were now being pursued to extend them. Co-operative research had given valuable aid. The very approach to design had been completely changed by the fact that at high temperatures one had to deal with plastic instead of elastic materials.

Electric Steam Raising.—At the informal meeting of the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 9th, Comm. F. J. Campbell Allen opened a discussion on electrode boilers for steam raising, pointing out that in Great Britain their application was largely to central heating and relatively little to process work, while on the Continent, notably in Switzerland and Italy, conditions were reversed. He added that the electrical production of steam for storage was almost unknown in this country. A number of h.v. and l.v. automatically operated equipments were described in which economy of space, simplicity of operation with safety, high efficiency, and rapidity of service were among the advantages claimed. As maintenance charges were negligible Comm. Allen asserted that with a reasonable tariff the electrode boiler for producing steam was without rival.

Traffic Control at Piccadilly Circus

STREET traffic signalling installations within the Westminster City Council's area now number thirty-three. The latest was inaugurated by the Minister of Transport on Monday last at Piccadilly Circus. This is said to be London's most intricate junction, for nine streets form complex intersections. The normal volume of traffic is 48,000 vehicles per twelve-hour day, or 6,000 in one peak hour.

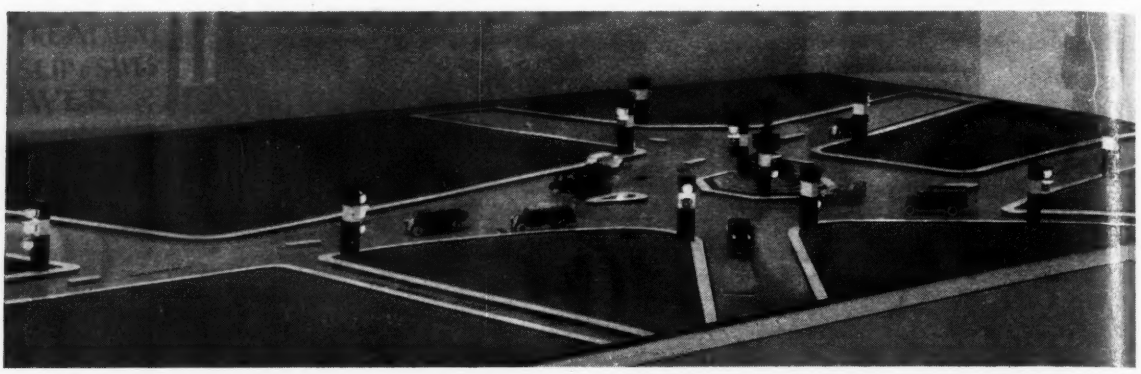
The vehicle-actuated equipment installed by the Automatic Telephone & Electric Co., Ltd., consists of thirty-eight signal faces, half in the Circus and half in the vicinity; thirty-nine road-pads, nine in the Circus and thirty others in roads round about, with two "green arrow" signals to permit "filtration." Seven controllers at various points are linked through a master timer, which is arranged to provide two plans of traffic control, one for periods of heavy traffic and one for periods of light traffic. The "change-over" is effected automatically by a time switch incorporated in the master timer.

The scheme employs the standard principle of "Electromatic" working with the addition of a recent development known as "density control" which gauges individual vehicles as units in a traffic stream and allocates a "right-of-way" period to each stream which will be appropriate to its particular density. This is effected by mechanism in certain of the controllers, in conjunction with the master timer. Its function is to seek for gaps between vehicles in each traffic stream and to shorten the length of the green "Go" period allowed to that stream in accordance with the number and duration of gap periods.

Density control is applied to individual traffic streams in each of the three main inlets to the Circus, and is also superimposed upon the control of the whole area, where and when necessary, by means of the master timer. The system is designed to operate in two stages with a "transition" period between, roughly north-south and east-west on the gyratory system round the Eros fountain. Three additional streets have been made one-way avenues so that the general directions of travel previously in use remain practically unaltered.

When manual control was in force no fewer than fifteen policemen were necessary each day to provide constant control at nine control points. The three-colour light signals will replace twelve policemen, which represents an annual saving of £3,000. The installation has cost £6,600 and the annual maintenance cost will be £500.

The company states that within five years "Electromatic" signals have been established at 1,200 road intersections in Great Britain, and much equipment has been exported.



A working model of the Piccadilly Circus traffic control system shown by the Automatic Telephone & Electric Co., Ltd., at the Public Works Exhibition *[Elec. Rev. photo.*

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

"What is the Explanation?"

With respect to your correspondent's inquiry in your issue of October 8th regarding the apparent cleansing action beneath wires passing over a roof, it seems to me that the problem may be solved by applying the same answer as to why the grass on a lawn is killed or stunted by a telephone wire or cable passing above it.

Rain falling on the wire or cable collects in small globules which, if the wire is not level, will tend to run along collecting more water, until finally they drop off. This water being very slightly acid in some cases, due to dissolved hydrogen-sulphide and/or carbon-dioxide, especially in town areas, will form a grass destroying copper salt solution, which, provided the air is still, will drop vertically on to a point beneath the wire. Two parallel straight lines consisting of burnt or stunted grass then appear on the lawn surface immediately beneath the pair of wires.

It is to be assumed that the cleansing action mentioned by your correspondent on discoloured tile roofs is due to the same cause. So far as I know, no practical use has been made of this phenomena; in fact, enthusiastic gardeners, proud of their lawns, will not tolerate telephone wires or cables anywhere near the seat of their labours.

Bombay, *November 5th.* RICHARD B. BESLEY.

Domestic Refrigeration Sales Efforts

I have read Mr. Clifford's letter in the current issue of the REVIEW on domestic refrigeration and would suggest that his remarks apply in many cases to all branches of the sales and service side of the supply industry and there is no doubt our gas friends surpass us in both, despite the persistent efforts of E.D.A. Let me give my personal experience as an example.

I am "all-electric" (no coal fire) with the exception of a gas geyser in my bathroom. My supply authority has just commenced a hiring scheme for water heaters, but I find I have to pay £1 2s. for a water connection if I hire. I found that a domestic all-in tariff had been introduced of which I received no notification. I asked for particulars, filled in the application form the first week in November and was advised that I was too late to be placed on the tariff for the December quarter; on the other hand I was told I should read my local paper and take an interest in my Council's activities.

These are unnecessary pinpricks which the gas industry carefully avoids, for where it hires out apparatus it is fixed free of cost and maintained in a highly efficient condition. In fact, the gas industry is a model to follow in all its dealings with consumers. PINPRICKS.

London, W.C.2, *November 15th.*

Request from the Gold Coast

We frequently receive interesting letters from various remote parts of the world. We have received a reply to an advertisement to-day, which seems to be evidence of the far-reaching circulation of the ELECTRICAL REVIEW. The advertisement appeared in your issue of December 4th, 1936, and our correspondent gives his address as "Electric Schop, Prestea, Gold Coast." The letter in question is appended.

BERRY'S ELECTRIC, LTD.,

London, W.1, *November 15th.* RAYMOND BERRY, Director.

Dear Sirs,—I take the honour of writing to you to-day for your Lighting Book, which I see is useful to me as I seem to be one of your candidates.

I was surprised when I saw your advertisement in the ELECTRICAL REVIEW, and I was quite intended to it. I am a very young boy, just finished my Secondary School at the Cape Coast Mfantsipun, and I ask this book with a view that you give me full and complete sketches, which I presume it will take me a long period to study.

If ever you desire me to pay for it I shall hastily do it. Lend here by virtue of sending me the same quickly. Many thanks and with Compliments of the Season.

I am, Your humble,

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Safety Signal Hooter

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has introduced a new safety signal hooter. It is designed for use in mines, oilworks, petrol stations, cellulose industries, gas and by-product works, for all of which it is fully covered by Home Office certificates.

This hooter operates from an approved source of d.c. (limit 24 V) such as 3-pint Leclanché cells or a dry battery. The piercing note it gives suggests many useful applications—for instance, as an alternate signal to a bell, as an extension signal to a telephone switchboard, as a fire alarm installed at various danger points, and also for staff location in the event of any dangerous situation arising. Strongly constructed in a cast-iron case, the appliance incorporates a relay which allows a long length of signal wire to be used with full potential always available at the hooter, and so gives maximum sound under all conditions.

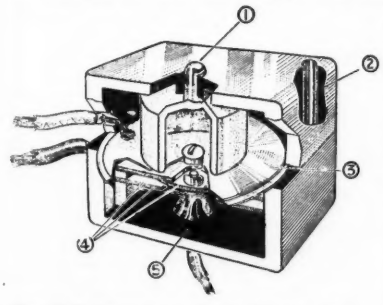
The hooter weighs 15½ lb. and its dimensions are: width 7¼ in., height 12¾ in., and projection 3¾ in.

Wind-driven Generator

GORDON EQUIPMENTS, LTD., 25, Milton Street, London, E.C.1, announce that the "Windcharger" wind-driven generating set is now being supplied rated at 120 W, 12 V, and at 650 W, 32 V, in addition to the 6-V model, which has already been described in this journal.

Snap-action Switches

The H-C vapour-proof switch, introduced by INTERNATIONAL TECHNICAL DEVELOPMENTS, LTD., Thames House, Millbank, London, S.W.1, has a snap action, light operating load and precision movement and can be mounted at any angle. It consists of a thin beryllium-bronze diaphragm cemented between hollow bakelite mouldings, the gas-tight bottom part of which contains silver-faced copper contacts. The overall dimensions are 1⅝ in. by 1 in. by 1 in. A laminated bakelite plunger projecting from the top half makes contact by displacing the diaphragm from one position of equilibrium to another by a snap movement of 0.002 in. The switch is claimed to be unaffected by vibration and to sustain no damage when operated above the boiling point of water.



The H-C vapour-proof precision switch

1, Laminated bakelite plunger. 2, Hole for fixing screw. 3, Beryllium bronze diaphragm. 4, Silver-faced copper contacts. 5, Vapour-proof contact chamber.

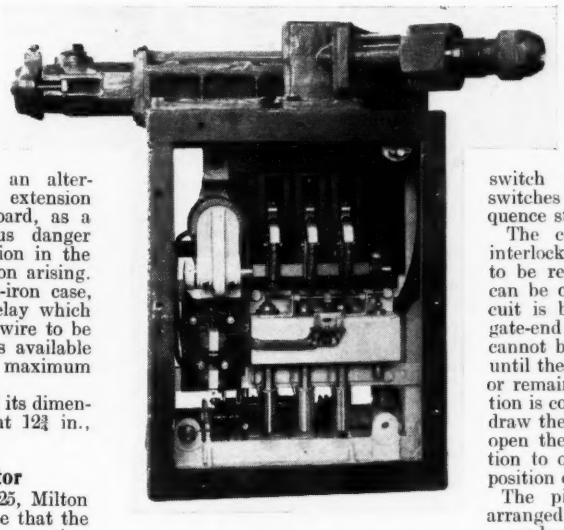
Three standard types are available all of which are designed for a.c. working to carry 10 A at 110 V or 5 A at 220 V, with a margin to withstand momentary overloads, and to operate with any motor up to ½ h.p. Special applications can be provided for. On d.c. circuits, condensers should be used when the load exceeds 200 W.

With Type A1, which is normally closed, heating and lamp loads are rated at slightly higher figures than when Type A2, which is normally open, is employed. Type A3 is a double-throw, single-pole switch.

Remote Control of Coal-face Machines

An automatic gate-end switch (with Buxton certification) rated at 700 A for voltages up to 650 is the latest production of BRITISH JEFFREY-DIAMOND, LTD., Wakefield, Yorks. Overall height is 2 ft. 4 in., width 1 ft. 8 in., and depth from isolator handle to the back of the box, 1 ft. 8 in. Any number of switches can be assembled in line to form a distribution board that is operated from the work itself.

The main triple-pole contactor is fitted with blow-out coil and arc chute for each phase and is electrically operated against spring pressure by a closing coil energised by the 17-V pilot current provided by a single-phase transformer and metal rectifier. To each of the adjustable overload coils in series with the main contactor are fitted inverse-ratio time lags of the oil dash-pot type. A combined isolating and reversing switch is interlocked with the contactor and the front and back covers of the steel case so that when these are removed no live metal is exposed.



Type RC/3 remote control switch with front cover removed

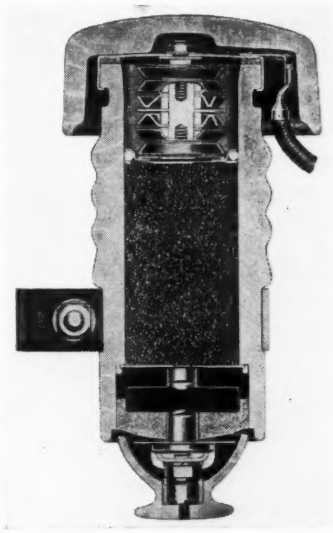
The contactor is operated by a pilot switch on the coal-cutter or conveyor, or alternatively by a push-pull pilot switch on the gate-end box. Pilot switches can be interconnected for sequence starting of motors.

The coal-cutter pilot switch includes interlocked contacts that enable the motor to be reversed from the machine; these can be operated only when the pilot circuit is broken and, in consequence, the gate-end switch is open. The contactor cannot be reclosed after failure of supply until the pilot switch is in the off position, or remain closed unless the earth connection is complete, and any attempt to withdraw the cable plug at the machine would open the contactor. Core-balance protection to operate at 2½-A leakage and two-position overload relays can be provided.

The pilot-operated contactor can be arranged to control a drill in the 125-V secondary of a 1.5-kVA three-phase transformer, which is mounted in the same case as the gate-end switch.

Protection from Lightning

The principle of the "Crystal Valve" lightning arrestor which has been introduced to the British market by JOHNSON & PHILLIPS, LTD., Charlton, S.E.7, is based upon the use of a silicon carbide known as "T-grain crystallite," which is practically an insulator at normal supply voltages, but becomes highly conductive at higher voltages. For example, between 1,000 and 10,000 V the resistance will fall from 675,000 to 9.3 ohms. The device is operated solely by the magnitude of the applied voltage, so that a lightning surge that causes the resistance to drop to a low value enables a heavy current to be discharged, but restoration of normal voltage immediately restores the resistance to its initial value. In practice, one or more spark gaps are installed in series with the crystallite to give a higher spark-over voltage than the normal voltage of the circuit.



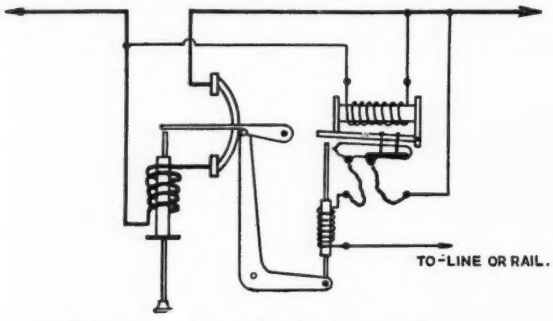
The "Crystal Valve" arrestor

In construction the arrestor consists of a wet-process porcelain body and cap enclosing the spark-gap assembly as well as the tightly packed mass of crystallite. Precautions against the entrance of moisture at the upper end of the body are a gasket seal made under heavy pressure between the upper end of the body and the copper cap that is crimped over it, a drawn copper shield attached to the end of the line conductor and the use of a plastic sealing compound with high melting point for attaching the porcelain cap to the arrestor proper. At the ground end the same plastic compound is employed backed up by a non-plastic cement to give mechanical strength. It is claimed that crystallite does not deteriorate in service. The range of voltage between phases covered by the various types available is from 350 to 33,000 V.

Sectioning Trolley-bus Systems

The "Hastings" automatic section coupler is manufactured by J. G. STATTER & CO., LTD., 82, Victoria Street, S.W.1, for

use on trolley-bus and tramway systems. Excess current flowing into an overloaded or faulty section causes the main circuit-breaker to open. As long as the overload persists a small current passes through a lock-out magnet that prevents the reclosing mechanism from coming into operation. When the voltage on the two systems becomes once more approximately equal, the lock-out magnet is de-energised and releases its armature, closing a mercury switch. This results in the



A diagram of the "Hastings" section coupler

energising of a solenoid, which closes the main breaker and opens the mercury switch. The tripping current of the breaker is adjustable within wide limits. Usually the mercury switch is set to close at from 8 to 10 V, but its coil is designed to withstand line voltage indefinitely. The closing of the device is independent of line voltage and is solely due to difference in voltages of two adjacent sections. Normally only the series coil of the coupler carries the equalising current and the main contacts are held in mechanically. As closing coils are in circuit only when required to operate, line leakage tests are not affected.

Accumulator Handlamp

Full official approval for its use in dangerous atmospheres, such as coal gas, hydrogen, and petrol vapour, has been given by the Home Office to the new "Nife" accumulator handlamp of BATTERIES, LTD., Hunt End Works, Redditch. It may therefore be said that the certificate received by this lamp is equivalent to Group 2, Buxton Certificate, with the addition that the lamp is also passed as safe for use in hydrogen. The accompanying illustration shows the neat construction of the lamp.

The "Nife" accumulator handlamp

Moulded Mica Condensers

The latest addition to the range of moulded mica condensers made by the DUBILIER CONDENSER CO., LTD., Victoria Road, North Acton, London, W.3, is the type 691W, moulded in a high insulation bakelite by a process giving protection against adverse atmospheric conditions. These condensers, available to manufacturers only, are fitted with 1¼-in. long 20 s.w.g. end wire connections, and have a low power factor. They are made for 350-V d.c. peak working, 750-V a.c. test, and in capacity values of from 0.002μF. to 0.01μF. The standard tolerance is ± 15 per cent., and they have spot blanks and arrows moulded on the body to facilitate colour coding if desired.

Domestic Electric Pump

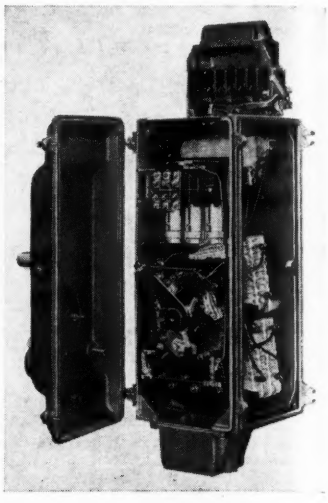
A "Climax" domestic electric pump, designed for operation with shallow wells, has recently been introduced by THOMAS & SON, LTD., Worcester. It is known as Model 54, and is a single cylinder double acting piston pump for total suction lifts of up to 25 ft. For minimising wear the speed of operation is low—the two sizes run at 400 and 285 r.p.m., respectively.

The "Climax" No. 54 double-action pump

High grade cast-iron is employed for the pump body, which has a ½-in. seamless solid drawn brass liner pressed into position. The body is detachable and can be supplied in bronze for special duties at small extra cost. The crankshaft and bearings are made of special high tensile steel and the packing gland is a complete gunmetal assembly. Spring-loaded rotating rubber disc type valves are employed, turning on bronze grid seats. The piston rod is of tough non-corrosive material embodying a bronze baffle so that water is prevented from creeping along the rod and entering the oil bath crankcase. Lubrication is automatic, replenishing being necessary about twice a year.

Starters for Slip-ring Motors

A series of hand-operated air-break stator and rotor starters for three-phase constant-speed slip-ring motors has been brought out by ERSKINE, HEAP & CO., LTD., Caroline Street, Salford, Manchester, 7. These are designed in accordance with B.S.S. 587-1935 to start a motor against 100 per cent. full-load torque normally with maximum ratings of 1 h.p. to 7½ h.p. at 200-230 V, from 1 h.p. to 12½ h.p. at 340-380 V, and from 1 h.p. to 15 h.p. at 400-440 V.



The "EH" motor starter for three-phase slip ring motors

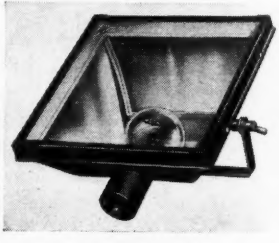
An automatic push-button-operated stator contactor, which can be fitted with either two or three wound-solenoid overloads with adjustable time lags and inherent no-voltage release, is combined in one case with a hand-operated face-plate resistance starter for the rotor. The stator contactor is closed by keeping the button pressed while the resistance is cut out slowly by the ratchet, which must be returned to the off position before restarting. Interlocks provide that all resistance is in before the stator contacts are closed and a free-handle feature is supplied as standard. The case and lid are of cast-iron with steel end and side sheets. Interlocked isolating gear can be fitted, adding 4½ in. to the height, which without them is 21 in.; the width is 10 in. and the depth 14¾ in. Starters are available either for wall or for floor mounting.

Floodlight Projectors

A range of floodlight projectors has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, designed especially for conditions where first cost is a primary consideration.

One of the six models is a general utility unit for building illumination for use with 500- or 1,000-W projector lamps to give medium or narrow beam distribution. The body and reflector are formed in one piece of non-tarnishable metal and heat resisting clear or diffusing front glass. It is 25 in. in diameter.

There is also a wide angle unit for the illumination of buildings, parks, &c., for medium offset, constructed in sheet metal with a copper-backed mirror reflector. It takes a 1,000-W general service lamp.



The G.E.C. F.E.1162 floodlight projector

Another model (FE1162) is for the illumination of building faces from a limited offset. It is constructed in sheet metal with a polished metal reflector. Both this and the previous unit are rectangular in shape, measuring 26½ in. high by 22¼ in. wide by 12½ in. deep and 15 in. high by 20¼ in. wide by 19¼ in. deep, respectively.

There are three models still lower in price, including a narrow beam floodlight constructed in aluminium with polished anodised reflector with stippled front glass and a G.E.C. holder for taking a 300-W general service lamp.

The FE1164 is for use with 400-W cap down burning electric-discharge lamps for floodlighting gardens, parks, &c. A wide-angle unit (F.17531) for the illumination of buildings from limited offset, has also been introduced. It takes 400-W high-pressure mercury electric-discharge lamps burning horizontally and is constructed in copper, with a silvered glass parabolic reflector, heat resisting front glass, supporting cradle and G.E.C. holder.

The Public Works Exhibition

How electricity is contributing to road safety

SAFETY on the roads is a matter which concerns everybody. At the biennial Public Works, Roads and Transport Exhibition being held this week at the Royal Agricultural Hall, Islington, N.1, it is possible to judge the extent which electricity is contributing to the solution of the problem confronting the highway authorities. The recommendations of the Departmental Committee appointed by the Minister of Transport as set out in the final Report just issued attach especial importance to questions of street lighting, and the Association of Public Lighting Engineers has, at the congress held in connection with the exhibition, been discussing the best methods for bringing the proposals into effect.

New types of street-lighting equipment conforming with the findings of the Report are therefore a conspicuous feature of the exhibition. A particularly interesting item in the comprehensive display of the B.T.H. Co. is a modification of the well-known "Mercra H" lantern for use with horizontally placed "Mercra" lamps. A patented magnetic deflector system permits the employment of standard high-efficiency mercury-vapour lamps with standard chokes. The advantage of this type of fitting is that a horizontally disposed source of light lends itself to simple optical control, with the result that the lantern can readily be designed to give the most effective distribution of light. It is thus possible to direct almost the entire output of the lamp into the direction in which it will be most useful for providing adequate visibility in the thoroughfare, at the same time obviating glare.

Many municipal activities are represented at this show and were dealt with in Congress papers. (See page 708)

A similar purpose horizontally operating "Osira" lamp, which does not require a magnetic deflector, is to be seen on the stand of the General Electric Co., Ltd., who are also introducing another new fitting specially designed for side-street lighting. It takes an 80- or 125-W "Osira" or "Osram" lamp and incorporates a solid blown fluted glass reflector, ensuring an even distribution. The latest "Osira" discharge lamp incorporates fluorescent powders for colour correction.

Siemens are drawing special attention to their latest fittings for side streets, including the "Pinnacle" and the "Duo-Dome," both of which take 80- or 125-W "Sieray QH" mercury lamps. A range of reflectors utilising "Sieray" lamps is available for all outdoor and indoor purposes, and a wide selection of floodlights is exhibited.

A reliable system for the control of street lamps is essential. Since the last exhibition the Horstmann Gear Co., Ltd., has commenced to manufacture its own synchronous motors for its time switches. One is shown running under a 12,000 per cent. overload. These motors, which incorporate a unidirectional clutch, are used in three thousand of the "Newbridge X/Syn/Sol" solar dial time switches recently installed at Birmingham.

Vehicle-actuated kerb lights for road junctions are perhaps the most outstanding innovation at the exhibition. Though applicable to any type of junction, roundabout, &c., the new "Liteway" system, for which C. C. Hancock & Co., Ltd., have applied for a provisional patent, is particularly suitable for important roads not otherwise illuminated. The depression of the detector pad causes the whole of the surface of the road to be illuminated, allowing head lamps to be switched off. On seeing the roadway lighted, another vehicle driver approaching the junction from a different direction would be warned to take special precautions. The lights can be extinguished either by a time switch or by another detector pad on the far side of the junction. The system, which has yet to be commercialised, appears to solve many of the present-day road difficulties. The fact that the lights are switched on only when required is a useful economy feature, which renders probable the extension of the system to controlling the lighting of consecutive stretches of comparatively little used main roads.

Of topical interest among the traffic sign exhibits is a working model by the Automatic Telephone & Electric Co., Ltd., of the "Electromatic" vehicle-actuated system put into operation at Piccadilly Circus on Monday (see page 710). On a separate stand this company demonstrates the various components of its system and introduces a number of new developments in automatic telephone equipment. These include new "Strowger" 25-line private exchange equipment, neon light signals as an alternative to bells, and the new "32A" switch, features of which are low maintenance, an exceptionally long life, speed of operation, and compactness.

On the G.E.C. stand the Siemens and General Electric Railway Signal Co., Ltd., has a model road signal layout operating in conjunction with the full-size "Autoflex" controller. Illuminated guard posts and kerbs, street refuge bollards, &c., are seen in different forms on the stands of Gowshall, Ltd.; Cardiff Foundry & Engineering Co., Ltd.; Taylor Bros. (Sandiacre), Ltd.; A. C. Woodrow & Co.; Yorkshire Switchgear & Engineering Co., Ltd.; O. C. Hawkes, Ltd.; John Needham & Sons, Ltd.; and Amcolite, Ltd. An adjustable inspection lamp fitting directly on to the top of a specially designed battery is an ingenious new product of Simplak Batteries, Ltd. The battery can be readily replated.

With regard to road machinery, electrically operated screens and mixers are demonstrated by a number of manufacturers, while specimens of electrically heated tar and bitumen tanks with capacities of from 100 to 5,000 gals. are being shown for the first time by Municipal Appliances Co., Ltd. All types of "Everite" piping are made by Turners Asbestos Cement Co.

Electrical interest in water and sewage purification plant centres largely on the control, indicating and recording instruments demonstrated by the Lea Recorder Co., Ltd.; George Kent, Ltd.; Electroflo Meters Co., Ltd.; Guest & Chrimes, Ltd.; and Evershed & Vignoles, Ltd., the last-mentioned company having a working model of its "Noflote" system. A plant by the O.C.P. Marketing Co. prevents the formation of scale by passing a minute charge of electricity through the water, thus altering the physical composition of the impurities. Ozone generators are shown by Paterson Engineering Co.

A new type of refuse collection vehicle makes its appearance on the stand of Electricars, Ltd. Other items include portable lighting plant (C. H. Johnson & Sons, Ltd., and the Tarpen Engineering Co., Ltd.), oil engines (Ruston & Hornsby, Ltd., and Petters, Ltd.), and electric mowers (Ramsomes).

Two of the brightest spots at the Public Works Exhibition, the B.T.H. and G.E.C. stands [*Elec. Rev. photos.*

British Overseas Electrical Trade

Already exports this year are approximately equal to the total value for 1936.

RISING above the September value, electrical exports in October established a new post-depression record. Figures abstracted from the Board of Trade returns for last month give the amount as £1,717,254, which compares with £1,622,527 in the previous month and £1,445,609 in October, 1936. The increase over the corresponding month of last year of £271,645 is equal to 19 per cent.

It is observable that the expansion was materially brought about by largely increased shipments of a few commodities. Most of the decreases shown in the accompanying table—of which there are eleven against thirteen increases—are, however, small and may be due to the month containing one fewer working day. That the trend is not downward is evident by comparison with the September figures, over which the majority of the items show an improvement.

From the point of view of markets the higher figures are well distributed. A number of the smaller markets continue to show improvement, those not classified separately yielding an increase of £81,601 in goods and apparatus. Whereas shipments to New Zealand, after a period of rapid expansion, were inclined to drop last month, a steady improvement continues in the case of Canada, to which electrical exports from this country increased by £14,274 to £32,814. There have been slight increases in exports to Spain in the last two or three months, but the Chinese market seems to be badly hit by the hostilities there.

Exports of wires and cables once again contributed substantially to the improved figures for the month, increasing by £140,767 to £432,890. Excluding telegraph and telephone wires and cables, the value of shipments to the principal countries last month were as follows (October, 1936, figures in parentheses):

Rubber insulated wires and cables.—Australia, £49,142 (£32,002); South Africa, £20,802 (£22,338); British India, £20,314 (£21,123); New Zealand, £10,417 (£10,874); other British countries, £25,320 (£14,979); and foreign countries, £19,988 (£14,419).

Electric wires and cables, insulations other than rubber.—British India, £51,321 (£23,383); South Africa, £37,163 (£21,879); Australia, £27,225 (£27,473); other British countries, £39,413 (£28,368); and foreign countries, £32,694 (£21,334).

A similar analysis of telegraph and telephone apparatus exports, other than radio, is as follows: Australia, £47,448 (£29,992); South Africa, £29,976 (£37,237); Argentina, £24,755 (£29,838); other British countries, £52,565 (£46,858); and other foreign countries, £39,141 (£29,024).

While there was a substantial decrease in imports of radio apparatus, exports in the aggregate were higher. The number of receivers (not radio-gramophones) shipped abroad was 9,100 against 7,146 in the corresponding month of last year. Both imports and exports of electric lamps were lower in value, but exports decreased in number from 1,852,000 to 1,464,000, whereas imports rose from 7,107,000 to 8,349,000.

Machinery exports, although lower than in September, were well above the values for October, 1936. The weights, in tons, of the chief classes of machinery exported last month and in October, 1936, were as follows: Generators, 545 (374); motors, 910 (677); and other types, 1,388 (1,358).

The advance in imports was comparatively small, amounting to £19,393, or 4 per cent. Actually, imports of goods and apparatus were of a lower value than in October, 1936, but a much larger quantity of machinery (437 against 281 tons) was brought from abroad. A decrease in imports of vacuum cleaners is shown, and it is interesting to compare imports and exports of these for the first ten months of 1935, 1936 and 1937:—Imports: £215,588, £159,860 and £155,070. Exports: £128,222, £188,471 and £210,790.

The following is an analysis of the chief sources from which goods and apparatus were obtained last month, with comparative values:—United States, £91,657 (£124,974); Germany, £90,745 (£75,929); Netherlands, £64,291 (£61,034); Belgium, £39,924 (£21,595); Switzerland, £17,952 (£16,494); France, £6,038 (£11,684); Austria, £5,181 (£7,717); other foreign countries, £51,129 (£47,456); British countries, £14,321 (£19,211).

Up to the end of October the value of exports was £14,992,975, which is £2,690,019 more than in the corresponding period of 1936 and is practically equal to the total exports for 1936. Imports at £4,159,329 are up £606,189.

EXPORTS AND IMPORTS DURING OCTOBER

	Exports. Oct., 1937.	Exports. Inc. or dec. compared with Oct., 1936.	Imports. Oct., 1937.	Imports. Inc. or dec. compared with Oct., 1936.
Submarine telegraph and telephone cables	£17,645	+ £17,588	*	—
Telegraph and telephone wires and cables (not submarine)	81,446	+ 27,552	*	—
Other insulated wires and cables	333,799	+ 95,627	£59,907	+ £22,982
Radio receivers, not radiograms (excluding valves)	45,736	+ 9,448	13,614	— 15,597
Radio transmitters (excluding valves)	26,617	— 5,153	*	—
Radio valves	52,472	— 3,350	25,719	— 274
Other radio parts and accessories	55,742	+ 4,315	88,283	— 13,682
Telegraph and telephone apparatus (other than radio)	193,885	+ 20,936	*	—
Electric carbons	*	—	5,285	— 3,489
Incandescent lamps	50,283	— 5,101	18,685	— 2,171
Other lighting apparatus	57,430	+ 4,008	63,164	+ 3,513
Primary batteries	15,385	— 4,392	*	—
Accumulators	71,536	— 301	*	—
Electric cooking and heating apparatus	25,971	— 873	*	—
House service meters	17,517	— 1,225	*	—
Other electrical instruments	20,776	— 611	29,915	+ 7,235
Unenumerated electrical goods and apparatus	140,885	+ 5,812	76,666	— 5,373
Electric generators up to 200 kW	35,330	— 272	*	—
Electric generators over 200 kW	56,718	+ 31,911	*	—
Electric motors	146,183	+ 36,741	28,684†	+ 6,185
Convertors and transformers	61,069	— 9,747	*	—
Starting and controlling gear for motors	31,287	+ 2,014	*	—
Switchgear	143,681	+ 39,666	*	—
Other electrical machinery	9,145	— 4,023	45,351	+ 21,850
Electric vacuum cleaners	26,716	+ 11,075	15,942	— 3,786
Total	£1,717,254	+ £271,645	£471,215	+ £19,339

* Not classified separately. † Not railway and tramway motors.

BRITISH ELECTRICAL EXPORTS DURING OCTOBER

Destination.	Goods and apparatus, Oct., 1937.	Inc. or dec. compared with Oct., 1936.	Electric generators, Oct., 1937.	Inc. or dec. compared with Oct., 1936.	Electric motors, Oct., 1937.	Inc. or dec. compared with Oct., 1936.	Other electrical machinery, Oct., 1937.	Inc. or dec. compared with Oct., 1936.
Irish Free State	£62,920	— £11,061	*	—	*	—	*	—
Channel Islands	15,975	— 5,361	*	—	*	—	*	—
Union of South Africa	160,395	— 20,221	£26,940	+ £20,307	£29,984	+ £5,917	£73,981	— £10,022
British India	146,536	+ 13,891	20,429	+ 13,360	16,884	— 1,727	38,652	+ 1,519
British Malaya	24,711	— 585	*	—	*	—	8,835	+ 2,141
Ceylon	13,701	+ 5,761	*	—	*	—	*	—
Hong Kong	30,449	+ 7,994	*	—	*	—	*	—
Australia	177,182	+ 36,817	15,476	+ 5,665	18,214	+ 6,419	14,413	+ 3,252
New Zealand	79,494	— 1,796	*	—	8,406	+ 1,465	7,671	— 3,857
Canada	14,929	+ 2,956	2,271	+ 1,058	10,392	+ 6,542	5,222	+ 3,718
Other British Countries	97,522	+ 38,403	16,959	— 2,872	24,357	+ 10,389	39,040	+ 13,702
Sweden	15,102	— 6,596	*	—	*	—	*	—
Denmark	36,432	+ 23,041	*	—	*	—	*	—
Netherlands	19,044	+ 6,894	*	—	*	—	2,520	+ 1,327
Belgium	16,684	+ 580	*	—	*	—	*	—
France	11,981	— 5,424	*	—	*	—	3,187	+ 1,252
Portugal	8,274	+ 2,941	*	—	*	—	*	—
Spain	3,436	+ 2,320	*	—	*	—	*	—
Italy	7,523	+ 7,368	*	—	*	—	*	—
Greece	9,422	+ 5,325	*	—	*	—	*	—
Rumania	34,032	+ 29,778	*	—	*	—	*	—
Egypt	14,249	+ 2,992	*	—	*	—	935	— 405
China	924	— 6,761	*	—	*	—	2	— 4,059
Brazil	7,811	— 14,393	*	—	*	—	*	—
Argentina	60,064	+ 6,219	*	—	*	—	2,502	+ 1,457
Other Foreign Countries	138,333	+ 43,198	9,973	— 5,879	37,946	+ 7,736	48,222	+ 17,585
Total	£1,207,125	+ £164,280	£92,048	+ £31,639	£146,183	+ £36,741	£245,182	+ £27,910

* Not classified separately. Vacuum cleaners are not included in this table.

Parliamentary News (BY OUR SPECIAL REPORTER)

The Fixed-price Light System

In the House of Commons on November 9th Mr. G. Strauss called attention to a matter which, he alleged, was causing widespread and bitter complaint in the poorer parts of South London, namely, the "extortionate" charges made to thousands of householders in these areas for the supply of electricity. There was a company operating in the area called the Fixed Price Light Co., which bought large supplies of electricity in bulk from the authorised undertakers at a cheap price, and retailed it to consumers at a high price. This was the only way in which the consumers in some areas were able to obtain electricity, because the company made arrangements with landlords owning large blocks of property to provide all the households with the necessary fittings, and to supply electricity. There was a fixed price for each lamp installed, whether the consumer used much electricity, little, or none at all. Thus the price that these people had to pay was exceedingly high—at least double the amount which the consumers would have to pay if they obtained their electricity in the ordinary way from authorised electricity undertakings. Mr. Strauss asked the Minister of Transport to inquire into the matter with a view to some sort of public control of the business. Mr. Naylor supplemented Mr. Strauss's statement.

Capt. A. Hudson, Parliamentary Secretary to the Ministry of Transport, said that as far as they knew the Fixed Price Light Co. was the only company which did this kind of business. It started in 1909, so that it was not any new thing which was being brought to their notice. In addition to Lambeth the company carried on its business in districts as far apart as Poplar, Barking and Willesden, and as far south as Gillingham, Kent. He was informed that the company was supplied with electricity by authorised undertakers and the scope of its operations was of considerable magnitude. In 1935 it supplied about 11,000,000 kWh to its various consumers. The company worked in the following way: It installed one meter at a selected point, and then it provided and maintained the necessary extensions, wiring and fittings for the supply of small users who had one, two or three lamps. These consumers were probably in a building, or in a number of buildings in the same street. He was told that the premises supplied were mainly short-term tenancies, where neither the landlord nor the tenant would be likely to incur the cost, ordinarily, of providing supply. The charge made included the installation, the wiring and the complete upkeep of the equipment. It was small equipment, because they were small consumers. It was rather difficult to compare the charge with that made in ordinary circumstances. In the past the company had supplied electricity in streets and localities where authorised undertakers had been unwilling to supply it, and in that it had supplied a public need. There was nothing illegal about its activities. He was going to ask the Electricity Commissioners to discuss the matter with authorised undertakers from whom the company obtained its supplies and see whether any further steps could or should be taken.

The Ministry proposed in the Electricity Distribution Bill to take certain steps which would include power for an authorised undertaker to take over a non-statutory company such as this if it was thought desirable to do so. The Ministry were making immediate inquiries and if he promised in future legislation to deal with this matter he thought it would meet the very genuine anxiety of hon. members. If that inquiry showed that steps were justifiable they might remedy the situation in the shortest possible time.

Mr. Herbert Morrison said he thought the supply companies ought to determine their contracts, and themselves take on the responsibility of supplying the consumers. There were now free wiring schemes, hire-purchase schemes and all sorts of devices for solving the problem of the small consumer. It was unsatisfactory that there should be this sort of middleman company between the supply undertaking and the consumer.

Railway Electrification

On November 10th Mr. Day asked the Minister of Transport whether he would give particulars of any recent communications received from the Railway Companies' Association relating to the further electrification of main lines; and was he now in a position to make a statement on the further improvements contemplated.

Mr. Burgin said that the hon. member would no doubt have observed that the electrification of certain additional sections of the Southern Railway had been added to the schedule to the Railways (Agreement) Act, 1935, by a certificate, a copy of which was laid before the House on November 2nd. He was informed by the Railway Companies' Association that, except for this modification, the position was the same as when his predecessor answered a question on this subject on May 6th, 1936.

Interference with Broadcast Reception

In reply to questions by Mr. L. Smith and Mr. Storey, the Postmaster-General, Major Tryon, said that inquiries regarding the proposals to be embodied in a Wireless Telegraphy Bill to deal with the question of electrical interference with broadcast reception in this country were being actively pursued but were not yet completed. He regretted that he could not at present give an assurance that it would be possible to introduce such a Bill during the current session.

Naval Electrical Station Engineers

On November 16th Sir Robert Gower asked the First Lord of the Admiralty whether he would arrange that Admiralty Order CE 3,422/37 should be put into operation with effect as from March 1st, 1937, in relation to senior electrical station engineers and electrical station engineers, in view of the fact that the Order in question related to the salary scales of inspectors of trades; that, according to Admiralty Order CE 11,105/22, electrical station engineers ranked as inspectors of trades; and that previous Admiralty Orders dealing with inspectors of trades had always been held to include electrical station engineers.

Mr. G. Shakespeare, who replied, said that the Admiralty Order quoted in the first part of the question referred to an agreement reached between the Admiralty and the staff associations representing the foremen and inspectors of trades serving in H.M. Dockyards, for improved scales of salaries for the grades specified in the Order. A claim from the Electrical Power Engineers' Association for the revised scales of salary for inspectors of trades to be extended to senior and electrical station engineers was under consideration, and he hoped that a decision would be reached in the near future.

Certified Flame-proof Apparatus

THE Mines Department has issued its customary schedule of electrical equipment for which certificates of flame-proof enclosure were granted during the three months ended September 30th, 1937. Certification is in three groups: (1) methane; (2) petroleum and acetone vapours; and (3) coke oven and coal gases, as follows:—

Anderson, Boyes & Co., Ltd.—(1) 650-V coal-cutter motors and starters, three-phase, 30 h.p., and d.c. 25 h.p.

Electrical Apparatus Co., Ltd.—(1 and 2) Indicating instruments 400 A and 600 V; (1) 650-V hand-operated drum controllers, 125 h.p., a.c. and d.c.; (1) 3,300-V stator reversing panel of 100 h.p. for frequent duty.

E.M.B. Co., Ltd.—(1 and 2, excluding acetone vapour) 650-V resistance units, 3.5 to 35 h.p.

Foster Engineering Co., Ltd.—(2) Oil-immersed, compound-filled and dry air insulated transformers up to 100 W, single-phase, 110-550 to 25 V.

Horace Green & Co., Ltd.—Three-phase s.c. motors, (1) 440 V up to 4 h.p., with remote push-pull switch and (1 and 2) 12.5 h.p. at 110-650 V.

Lancashire Dynamo & Crypto, Ltd.—(2) 650-V d.c. motors of 5 to 123 h.p.

Laurence, Scott & Electromotors, Ltd.—(1 and 2) 110-650-V d.c. motors and generators of various ratings; (2) 110-650-V, three-phase, s.c. motors of 1.5 and 2 h.p.

London Fan & Motor Co., Ltd.—(2) Fractional h.p. "Breeza" fan motors, three-phase. 400 V, two phase, 200 V, and single phase, 230 V.

M. & C. Switchgear, Ltd.—(1) 660-V draw-out oil circuit-breakers, d.c., 100-200 A, in various forms; (1 and 2) 660-V air-break straight-on reversing starter, 100-A single- two- and three-phase of various types.

Metropolitan-Vickers Electrical Co., Ltd.—(1) 400-650-V air-break direct-on starters, a.c. up to 20 h.p., reversing and non-reversing.

Nalder Bros. & Thompson, Ltd.—(1) Moving-coil and moving-iron indicating instruments.

W. & H. Nelson, Ltd.—(1) Plug and socket connector, 100 A at 660 V, with pilot or mechanical interlocking.

Bruce Peebles & Co., Ltd.—(1 and 2) Three-phase, 220-650-V motors, 3.5 to 165 h.p., surface cooled s.c. type; (1 and 2) 650-V, three-phase, slip-ring units with brush-lifting and s.c. gear.

Siemens-Schuckert (Gt. Britain), Ltd.—(1) Push-button air-break pilot switch, up to 10 A at 30 V.

Sunderland Forge & Engineering Co., Ltd.—(1) A.c. cable connector for 100 A up to 660 V.

Allen West & Co., Ltd.—(1) A.c. air-break reversing drum master switch for 40 A at 600 V; also three-phase stator reversing switch for 150 A at 3,300 V.

Heyes & Co., Ltd.—(3) Prismatic fitting for 60-100-W lamps; double- and triple-pole fuse-switches for 10-15 A at 600 V; single and double pole air-break switches for 10 A at 250 V.

Revo Electric Co., Ltd.—(3) Well-glass fitting for 150-200-W lamps with internal heat dissipating ring; associated multi-way conduit junction box for 5 A at 250 V.

Veritys, Ltd.—(2) D.c. fan motor up to 3 h.p. and 600 V; (3) well-glass fittings for 60- and 100-W lamps.

Walsall Conduits, Ltd.—(2) Six-way switch-fuse unit up to 10 A at 500 V; (3) well-glass fitting for 100-150-W lamps with or without external reflector.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

The British Pavilion at the Paris Exhibition

The question of the reopening of the British Pavilion at the Paris Exhibition in 1938 was considered by the Executive Committee of the Federation of British Industries on November 10th when a statement was issued to the effect that the Federation regrets the recent decision of the Bureau International des Expositions to authorise the reopening of the Paris Exhibition in 1938 as this seems contrary to the provisions of the International Convention of November, 1928. Considerable prejudice will be caused to the Empire Exhibition which is due to open in Glasgow in 1938, for although this exhibition does not come within the scope of the International Convention, the organisers of that exhibition chose the year 1938 in the belief that under the terms of the International Convention no other major exhibition would be held during that year. With regard to the future of the British Pavilion, the Federation is of opinion that from the commercial point of view no substantial advantage would accrue to British industry by reopening it in 1938.

The Department of Overseas Trade announces that the Government has decided, after careful consideration, that it is not possible to accept the French Government's invitation to continue the United Kingdom participation when the Paris International Exhibition is reopened for a further period in 1938. The French Government has been informed accordingly.

Thomas Tilling's garage in Brompton Road, S.W., lighted by means of Siemens "Sieray-Dual" electric-discharge lamps

The Empire Exhibition, Glasgow

Although there has been no concerted action, the electrical industry looks like being well represented at the Empire Exhibition which is to be held at Bellahouston Park, Glasgow, from May to October next year. Below we give the names of electrical and allied concerns who have definitely reserved space so far:—

Avery, W. & T., Ltd. (weighing, counting, and testing machines).
Babcock & Wilcox, Ltd. (boilers, machines, &c.).
Bakelite, Ltd. (synthetic resin products).
British Aluminium Co., Ltd. (modern applications of aluminium).
British Electrical Development Association (generation, distribution, and application of electricity).
British Electrical Repairs, Ltd. (armatures, commutators, and general electrical plant).
British Insulated Cables, Ltd. (welders, moulding machines, condensers, meters, &c.).
British Ropes, Ltd. (steel wire ropes, &c.).
British Thomson-Houston Co., Ltd. (domestic electrical appliances, &c.).
Butters Bros. & Co. (electrical derrick crane).
Cable & Wireless, Ltd. (cable and wireless station, &c.).
Carron Company (heating and cooking appliances).
Drysdale & Co., Ltd. (pumps).
Electrolux, Ltd. (vacuum cleaners and polishers).
Ellam Duplicator Co., Ltd. (electric duplicators).
English Electric Co., Ltd. (domestic appliances, meters, switchgear, motors, etc.).
French, W. T., & Son, Ltd. (domestic appliances).
General Electric Co., Ltd. (general electrical apparatus).
General Utility Co., Ltd. (refrigeration equipment).
Hoover, Ltd. (cleaners).
Ideal Home Electrical Appliances, Ltd. (health appliances).
Kelvin, Bottomley & Baird, Ltd. (electrical and scientific instruments).
Kent, George, Ltd. (metering and automatic control equipment).
Macfarlane Engineering Co., Ltd. (rotary convertors, generators, &c.).
M. & C. Switchgear, Ltd. (switchgear and control gear).
Mavor & Coulson, Ltd. (coal conveyors, &c.).
Metropolitan-Vickers Electrical Co., Ltd. (general electrical plant).
Prestcold Refrigerators (Glasgow), Ltd. (refrigerators).
Reyrolle, A., & Co., Ltd. (general electrical plant).
Ritchie Atlas Engineering Co., Ltd. (conveyors, &c.).
Siemens Electric Lamps & Supplies, Ltd. (cables, instruments, and domestic appliances).
Weir, G. & J., Ltd. (power plant, pumps, &c.).

A Garage Lighting Installation

The accompanying illustration shows a new garage erected by Thomas Tillings at Tullet Place, Brompton Road, S.W., the lighting of which is provided by Siemens 300-W "Sieray-Dual" electric-discharge lamps in dispersive reflectors, and it will be seen that the shadows are very soft and also that the illumination over the whole area is very even. In the yard and approach 400-W "Sieray" electric-discharge lamps are used in bi-way lanterns. The installation was carried out by L. G. Tate, Ltd., in collaboration with Siemens Electric Lamps (& Supplies), Ltd.

Two Lamp Showcards

Britannia Electric Lamp Works (1934), Ltd., has just brought out two new showcards advertising its lamps. The larger one draws attention to the company's shilling lamps up to 60 W, while the smaller one relates to "Excelsior" lamps, and has a container for leaflets.

Berry's Electric Newcastle Showrooms

Berry's Electric, Ltd., has recently transferred its Newcastle-upon-Tyne branch to new showrooms and offices at 55, New Bridge Street. The accompanying illustration shows the entrance hall of the building, where fires and fittings of the company's manufacture are exhibited.

The new showrooms at Newcastle of Berry's Electric, Ltd.

Australian Electrical Notes

Our Australian correspondent reports that the Sydney County Council will probably put into operation shortly a plan whereby factory owners desirous of increasing their plant can purchase the electrical equipment required on a hire-purchase basis. A deposit of 20 per cent. will be required, and the balance will be extended over a period of three years, repayments being made with the quarterly accounts. The

necessary equipment will be purchased by the Council at discounts on advertised prices and sold at list price.

A Bill is in course of preparation in the Western Australia Legislative Assembly dealing with electrical installations, and in this provision will be made for minimising radio interference.

Judge Beeby, in the Commonwealth Arbitration Court recently, dismissed an application by the Electrical Trades Union of Australia for preference of employment to juniors and process workers who are members of the union and engaged in the manufacture of radio batteries and electrical appliances. The application was made on the ground that since the Court had made an award applicable to all employés, instead of to union members only, a substantial number of the employés concerned had ceased to be financial members of the union. In giving judgment, Judge Beeby said that "the practice of the Court had been not to grant preference to unionists except where an employer discriminated against unionists."

E.C.A. (Potteries Branch)

The annual dinner of the Potteries Branch of the Electrical Contractors' Association was held on November 4th at the Grand Hotel, Hanley. Mr. L. A. Madew (chairman of the branch), in proposing the toast of "The City," said that the local branch of the E.C.A. had never been stronger, and had added ninety new members during the year. While they appreciated that the Corporation was out for the advancement of the city, they also realised that the Council could give an example of citizenship by placing work with local firms who were ratepayers. Mrs C. H. Yeaman (chairman of the Stoke branch of the E.A.W.), in proposing the toast of the E.C.A. and Allied Associations, said that her Association wanted the easiest terms from the City Council, the best appliances from manufacturers, and from the members of the E.C.A. the neatest and safest jobs that were possible. They also expected the Association to give adequate installations and to educate them against the speculative builder. Mr. A. Smith, in responding, referred to the McGowan Report and thought that eventually the contractors would have nothing to lose by it. The Mayor, who also referred to the McGowan Report, said that most of the municipal undertakings in the North-West Midlands had said, with no uncertain voice, that they wished to preserve their identity. The City of Stoke-on-Trent had hesitated and he hoped they would make up their minds and make it known that they wished to co-operate with the smaller undertakings in opposing the proposals contained in the report.

Industrial and Business Management

The Studd Lectures on industrial and business management recently given at the Polytechnic, Regent Street, W.1, have now been published in booklet form and can be obtained from the director of education at the Polytechnic. The first of these lectures, "Personal Problems in Industrial Concerns," which was given by Mr. M. J. Railing, vice-chairman and joint managing director of the General Electric Co., Ltd., was abstracted in our issue of May 28th, 1937.

Home-made Publicity Aids

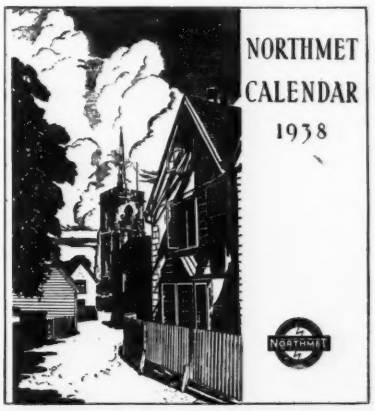
The success of every type of trader, manufacturer, wholesaler or retailer is to-day dependent to a very large extent on suitable publicity materials. Few realise that even the comparatively small concern can itself produce speedily and cheaply all its requirements of posters, showcards, cut-outs, price tickets, &c. At an exhibition now being held at the Building Centre, 158, New Bond Street, London, W.1, the artistic and commercial possibilities of the latest "Masseeley" hot, roll-feed unit are being illustrated by over a thousand

The prize-winning display by the Metropolitan Electric Supply Co., Ltd., at the Mason Seeley exhibition of commercial art

entries submitted by users for a national contest organised by the makers, Mason Seeley & Co. Demonstrations of the apparatus indicate its use for all types of colour printing. Operating equally effectively on such varied materials as paper, card, wood, fabric, leather and celluloid, it is especially suitable for individual jobs, short runs and multi-coloured work required at short notice. An elaborate three-coloured showcard, 12 in. by 8 in., in reasonably expert hands, can be produced ready for use in fifteen minutes, and replicas can be run off at the rate of five hundred an hour. The machine can be used to cut out and fashion original screens and display stands. The entries in the competition leave no doubt as to the effectiveness of the products. Several well-known electrical concerns are already users and among the prize-winning entrants we noticed the Metropolitan Electric Supply Co., Ltd., and the Marconiphone Co., Ltd. The show closes on Wednesday.

The "Northmet" Calendar

A handsome calendar for 1938 has come to hand from the North Metropolitan Electric Power Supply Co. This is being distributed to a quarter of a million consumers, and as in previous years each monthly sheet bears an excellent reproduction of a photograph of a selected rural scene within the company's supply area.



The cover of the 1938 "Northmet" calendar

French Foreign Electrical Trade

The French imports and exports of electrical machinery, apparatus and cognate material during the first half of the current year as compared with the corresponding six months of 1936 are shown in the appended table. The values are given in thousands of francs, while, for purposes of comparison, the sterling value of the totals converted at 147 fr. to the £ are also given. It will be seen that both sections of the trade show an increase, imports having advanced to the extent of £527,000 or over 73 per cent., and the exports by £229,476 (nearly 40 per cent.).

	Imports. Jan.–June,		Exports. Jan.–June,	
	1936.	1937.	1936.	1937.
	1,000 Fr.		1,000 Fr.	
Dynamo-electric machines, transformers and parts	14,329	26,076	9,803	14,131
Telegraph, telephone and other electrical appliances	52,894	89,673	34,147	41,268
Incandescent lamps and radio valves	16,959	38,224	6,879	10,127
Arc lamps and parts	81	106	9	54
Carbons for electrical and industrial purposes	2,701	4,161	6,364	10,060
Electric wires and cables	2,983	4,532	12,115	19,903
Parts of electrical apparatus	8,345	10,501	5,518	8,443
Magnets, other than electromagnets	299	482	—	—
Accumulators and parts	738	935	4,441	7,501
Dry batteries and condensers	5,423	7,332	1,061	1,407
Porcelain and other insulators	749	1,148	4,090	5,266
Total fr.	105,501	183,170	84,427	118,160
Total at 147 fr. to £	£717,694	£1,244,694	£574,333	£803,890

The Cardiff Engineering Exhibition

The annual engineering exhibition held under the auspices of the South Wales Institute of Engineers was opened on Wednesday at the Greyfriars Hall, Cardiff, and will continue until the end of next week. A review of the exhibits will appear in our next week's issue.

An Exhibition of Insulating Materials

An exhibition of insulating materials and components for the electrical, radio and allied industries is to be held by the United Insulator Co., Ltd., at the Hotel Great Central, London, N.W., from Monday to Friday next.

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:—R. Morritt, Leeds, 2; Davis, Myer & Co., Chenies Street, London, W.C.1; E. T. Spreckley, Cheadle Hulme, Cheshire; and Lawrenson & Rushton, Glasgow, W.4. At the same meeting one application was withdrawn and four were declined.

Australian Duty on Cables

The Department of Overseas Trade has been informed by H.M. Senior Trade Commissioner in Australia that the Commonwealth Minister of Trade and Customs has referred to the Tariff Board at the request of local manufacturers the question of telephone duties on paper-insulated lead-covered telegraph and telephone cables further processed by a covering (outside lead sheath) of any protective material, covered by Item 181 (a) (1) (a) of the Customs Tariff. Items 181 (a) (1) (a) is as follows:—Covered cable and covered wire not elsewhere included: British preferential tariff, free, intermediate

and general tariffs, 15 per cent. *ad val.* Any United Kingdom firms or trade associations interested in the above references should communicate with the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference 16024/1/37 should be quoted.)

Vitreous Enamellers' Trade Sign

The Institute of Vitreous Enamellers has recently registered at the Patent Office a trade sign which we reproduce herewith. The purpose of the sign is to enable the public when purchasing vitreous enamelled goods readily to distinguish between the genuine vitreous enamelled product and such other finishes as stoved synthetic paints, &c. The trade sign is available in three forms—labels, tags and transfers. The transfers are for use when the imposition of such a transfer does not interfere with the general appearance of the article, adhesive labels are to be used where transfers are impracticable, and tie-on tags where the nature of the product is such as not to permit of the affixing of an adhesive label. Licences will be granted to approved manufacturers to affix these "hall marks" or trade signs to goods produced in accordance with the specification prepared by the Institute.

Orders Recently Booked

Sunbeam Commercial Vehicles, Ltd., has received an order from Capetown for a fleet of sixty Sunbeam-B.T.H. six-wheel trolley-bus chassis. The 66-seater, double-deck bodies for these vehicles will be of the Metropolitan-Cammell-Weymann patented metal construction. This is one of the largest overseas trolley-bus orders ever placed, its total value being approximately £170,000.

Marryat & Scott, Ltd., have received a contract for the complete lift installation at the Valetta Hotel, Malta. The architect is Mr. W. B. Binnie.

Trade Announcement

The Century Refrigeration Co., Ltd., has removed to 12, Princes Street, Hanover Square, W.1 (telephone: Mayfair 2150).

Fusion Welding

With the improvement of the technique of fusion welding, there is an increasing tendency to apply the process to parts for which experience has shown it to be altogether unsuited. In consequence there is a noticeable increase in the number of breakages of welded parts subjected in service to fluctuating stresses. Typical examples in the technical report for 1936 of the British Engine, Boiler & Electrical Insurance Co., Ltd., teach lessons which should afford useful guidance when the repair of a part by fusion welding is under consideration. In addition the report contains records of investigations into the causes of a number of failures of boilers, superheater and other tubes, electric motor shafts, crane parts and similar mishaps.

I.F.S. Lamp Imports

In Dail Eireann on November 10th Mr. Sean Lemass, Minister for Industry and Commerce, moved the confirmation of the Control of Imports (Quota No. 31) Amendment Order, 1937, and the Control of Imports (Quota No. 34) Order, 1937, which places restrictions on imports into the Irish Free State of electric lamps for use in motor cars and private houses He said that the lamps at present being produced in the Free State factories were being tested by the Post Office Stores Department and by the Electricity Supply Board, who had pronounced the quality to be satisfactory. They were being sold at the same price as the standard lamps being manufactured by the British Combine. The Orders were confirmed.

Regulations and Registration

Considerable interest has been shown in the question of compulsory wiring regulations and registration at meetings of the Association of Supervising Electrical Engineers. At meetings held at Birmingham, Sheffield and Bristol, the following resolution was carried unanimously:—"That this meeting, representative of all sections of the electrical industry in . . . . . welcomes the efforts of the Association of Supervising Electrical Engineers to bring about compulsory wiring regulations and registration for the electrical installation industry and suggests the formation of an electrical industry committee for the purpose of preparing a scheme for submission to the Minister of Transport at the earliest possible date."

Further meetings are being held at Newcastle-on-Tyne (November 18th) and Eastbourne (November 26th). On February 15th, 1938, an official paper will be read at the A.S.E.E. meeting at the Lighting Service Bureau, in London, entitled "For and Against Compulsory Wiring Regulations and Registration."

Social Events

The annual dinner of Standard Switchgear, Ltd., was held on November 12th. About 100 were present and a full programme of entertainment was arranged and the function ended with dancing. Mr. Brackpool proposed the toast of the company and referred to the loyal co-operation of the men, and staff with the principals. Mr. J. A. Collis replied on behalf of the company, outlining the improved measures that had been taken for the workmen and staff, and announced that the company had in hand contracts covering the next two years so that continuous work was assured. Three times as many men were employed as compared with last year. Mr. C. G. Collis proposed the toast of "The Visitors," which was replied to by the chairman of the Brentwood Urban District Council.

The second annual supper of Henley's (H.O.) Bowling Club was held on November 12th at the "Crown and Cushion," London Wall, when Mr. J. W. Lapthorn, chairman of the Club, presided. Among the forty members and guests present were the president of the Club, Sir Montague Hughman; three of the vice-presidents, Mr. W. F. Bishop, Mr. Wm. McClelland, and Dr. P. Dunsheath; Mr. Sidney J. Fox, sports secretary of the City Livery Club; and Mr. C. Nicholls and a number of other members of the City of London Bowling Club. Prizes were presented by Sir Montague Hughman. In proposing the toast of the "The President and Vice-Presidents," Mr. Lapthorn compared the present-day Saturday afternoon with his early days at Henley's, when there were no organised facilities for sport. In reply, Sir Montague Hughman congratulated the club on the growth of its membership during the 1937 season. Other toasts were proposed and responded to by Mr. Wm. McClelland and Mr. C. A. Locke; Mr. W. F. Bishop (who drew attention to the North Woolwich Bowling Club—Henley's oldest sporting activity—which recently completed its twenty-fifth year) and Mr. S. J. Fox; Mr. A. H. M. Jacob and Mr. C. Nicholls; Mr. W. A. Moore and the chairman. During the evening, which concluded with an entertainment, photographs of the Sir Montague Hughman and W. F. Bishop cups were presented by the chairman to those gentlemen on behalf of the club, and also to the respective winners of the cups.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price. November 17th.	Fortnight's Inc. or dec.
a Acid Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal)... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£22 10s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda, Chlorate ... ... per lb.	3¼d. to 3½d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. net.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ... ,,	1/3 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£190	£12 dec.
Grade II ... ... ,,	£135	£7 dec.
Grade III... ... ... ,,	£77	£4 dec.
c Brass (rolled metal 2" to 12" basis)... per lb.	8¾d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	11¼d. to 11½d.	¼d. dec.
c ,, Wire, basis ... ... ,,	8¾d.	¼d. dec.
c Copper Tubes (solid drawn) ... ... ,,	1/0¾	¼d. dec.
g ,, Bars (best selected) ... per ton	£78	£2 dec.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£46	£3 dec.
d ,, ,, Wire Rods ... ,,	£51 10s.	£3 dec.
d ,, ,, H.C. Wire ... per lb.	8¾d.	1d. dec.
f Ebonite Rod ¾" dia. & up ... ... ,,	1/10 to 2/5	—
f ,, Sheet ⅛" thick & up ... ... ,,	1/5 to 1/10	—
n German Silver Wire, Nos. 1 to 12... ,,	2/4	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	7¾d.	¼d. dec.
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s.	—
i ,, Wire galv. No. 1 P.O. Qual.... ,,	£23	—
g Lead, English Pig ... ... ,,	£19 10s.	5s. inc.
g Mercury ... ... per bot.	£13	—
e Mica (in original cases) small ... per lb.	10d. to 2/–	—
e ,, ,, ,, medium ... ,,	6/– to 12/6	—
e ,, ,, ,, large ... ,,	13/– to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/3	¼d. dec.
p ,, ,, drawn bars & rods ,,	1/1¾	¼d. dec.
p ,, ,, rolled strip & sheet ,,	1/1¾d.	¼d. dec.
p ,, ,, wire ... ... ,,	1/1	¼d. dec.
o Platinum ... ... per oz.	£8 15s.	15s. dec.
d Silicium Bronze Wire ... ... per lb.	9d.	½d. dec.
g Spelter ... ... per ton	£16 2s. 6d.	6/3 dec.
r Steel, Magnet, in bars ... ... per lb.	7½d.	—
g Tin, Block (English) ... ... per ton	£188	£14 5s. dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	4/3	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

A Birmingham "All-electric" House

The third "all-electric" house to be declared open by the Birmingham Corporation Electric Supply Department this year was opened to the public on November 13th. It was officially opened by Mrs. C. C. Garrard, chairman of the Birmingham and District Branch of the E.A.W., who said that all the devices which were on view in the house were within the reach of the pockets of working men.

Catalogues Required

Graham Farish, Ltd., Bromley, Kent, ask for catalogues and literature from manufacturers of industrial metal rectifiers.

Arc Welding

In our last week's note upon the useful arc-welding booklet produced by Philips Industrial we credited it with only four pages. Actually it has forty-six.

For Sale

Frank Colebrook & Partners offer for sale two 300-b.h.p. engines direct-coupled to 242-kW dynamos.

Goddard & Smith will sell by auction at 13, High Holborn, W.C., on December 2nd a stock of cables and electrical accessories.

Finchley Electricity Department invites tenders for the purchase, dismantling and removal of one 1,486-kW Brush Ljungstrom turbo-generator.

(See our Classified Advertisements.)

New Catalogues and Lists

W. Sanders & Co., Ltd., Falcon Electrical Works, Wednesbury.—A 36-page illustrated catalogue of plugs, sockets and switches.

C.A.V.-Bosch, Ltd., Acton, London, W.3.—A catalogue of armour-plated lead acid batteries for commercial purposes.

Benjamin Electric, Ltd., Brantwood Works, Tottenham, London, N.17.—A 64-page illustrated catalogue of planned lighting equipment. A special feature is twelve problems illustrating and describing how the illumination of various kinds of buildings is carried out.

Cressall Mfg. Co., Ltd., 31/32, Tower Street, Birmingham, 19.—Leaflet describing an electric branding iron and radial-type dimmers.

Hailwood & Ackroyd, Ltd., Morley, Leeds.—An illustrated catalogue (pp. 36) of electric lighting fittings.

Hornby Electrical Supplies, Ltd., 7, Carlisle Street, Dean Street, London, W.1.—A comprehensive (160-page) catalogue of all kinds of electrical supplies, mainly suitable for domestic use.

British National Electrics, Ltd., Newarthill, Motherwell, Lanarkshire.—Details of the new "Modernette" cooker.

Hoffmann Mfg. Co., Ltd., Chelmsford.—A 127-page illustrated art catalogue of ball and roller bearings. It lists a larger number of types and sizes and includes technical information on methods of calculating loads on bearings.

British Insulated Cables, Ltd., Prescot.—A leaflet dealing with pole mounting fuse boxes.

Veritys, Ltd., Plume and Victoria Works, Aston, Birmingham, 6.—Catalogues of "Maxlume" ships' lighting fittings and modern industrial reflectors, and a stock list of a.c. motors.

G.V.D. Illuminators, Ltd., Aldwych House, London, W.C.2.—A brochure illustrating thirty-two G.V.D. lighting installations.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A complete 44-page catalogue of industrial electric cooking equipment.

Keith Blackman, Ltd., 27, Farringdon Avenue, London, E.C.4.—A leaflet dealing with "Electrofin" air heater units.

Ferranti, Ltd., Hollinwood, Lancs.—A catalogue (pp. 32) of new season's electric clocks.

Magnetic Valve Co., Ltd., Bush House, London, W.C.2.—An illustrated technical booklet dealing with temperature control for all purposes.

Silentbloc, Ltd., Victoria Gardens, Ladbroke Road, Notting Hill Gate, London, W.11.—A catalogue of flexible couplings.

B.T.H. Co., Ltd., Crown House, Aldwych, London, W.C.2.—A pamphlet entitled "The Case for the Magnetic Control of Horizontally Operated Mercury Discharge Lamps."

Bankruptcy Proceedings

G. E. Hewett, radio dealer and electrical engineer, Harrow.—An application was made to Mr. Registrar Kean at the London Bankruptcy Court on November 11th for an order of discharge on behalf of this debtor, who carried on business at the date of failure in June, 1937, at 107, Kenton Road, Harrow. The receiving order was made on the petition of the debtor's father. The Official Receiver reported that the liabilities amounted to £400 against assets of £2, but nothing had been recovered. The debtor attributed his failure to insufficient capital, liability under a guarantee given on behalf of a third party, and to vindictiveness on the part of his father. His Honour, in suspending the discharge for fourteen days, remarked that this bankruptcy was obviously the result of a family dispute.

B. H. Auld (lately carrying on business as Bruce H. Auld & Co.), electrical engineer, Victoria Street, Westminster, S.W.—This debtor applied on November 10th to Mr. Registrar Kean at the London Bankruptcy Court for an order of discharge. Mr. H. H. Gaine, Senior Assistant Official Receiver, reported that the applicant failed last March with ranking liabilities of £2,587: the assets had realised £1,816, and a further £850 was expected to be recovered; a first dividend of 3s. in the £ had been paid, and a further dividend of 11s. or 12s. in the £ would be declared. The failure was attributed to heavy expenses incurred in the development of filtration plant and equipment, to delay in collection of money due for work done, and to the falling through of negotiations for the formation of a company to acquire the debtor's business. Mr. Blagden appeared for the debtor in support of the application, and in the absence of any opposition an immediate discharge was granted.

E. Cohen (trading as Manor Wireless Supplies), 746b, Romford Road, Manor Park, and Argyle Road, Ilford.—This debtor, who failed in May, 1933, applied last week at the London Bankruptcy Court for an order of discharge. The Official Receiver reported that the liabilities amounted to £947, while the assets, valued at £128, had realised £67. No dividend was paid to creditors. Debtor attributed his failure to lack of capital, inexperience, and depreciation in value of stock owing to changes in radio sets and component parts. The discharge was suspended for nine months.

H. K. Hawkins, lately 48, Beaufort Road, Edgbaston, Birmingham, electrical engineer.—The adjourned public examination was held recently at Birmingham, when it was reported that debtor had no assets, and his liabilities amounted to £111. He commenced trading in 1934, when he was appointed agent for the sale of electrical appliances. He borrowed his capital of £100. The business was not successful and he attributed his failure to insufficient income to meet the expenses of a distribution agency, selling goods at less than cost price, and illness. The examination was closed, subject to the signing of the notes.

E. S. N. Rees, carrying on business under the name of Sydney Norman Rees, 4, High Street, Llanhilleth, Monmouthshire, radio dealer.—The application for discharge herein was heard at the Town Hall, Tredegar, on November 11th, when it was reported that the receiving order was made in 1933. A dividend of 3s. 6d. in the £ had been paid to creditors. The Judge granted the discharge subject to one month's suspension.

G. L. Branford, radio and electrical engineer, 68, Margate Road, Ramsgate.—Receiving order made November 9th on debtor's own petition.

R. Paddon, radio dealer, Sea View Terrace, St. Ives, lately trading at Chapel Street, St. Ives, Cornwall.—Receiving order made November 10th on a creditor's petition.

R. Corbett and **I. A. J. Merritt** (Corbett & Merritt), electrical and radio engineers, 2B, Junction Road, Andover.—First meeting November 19th at 12, Rolleston Street, Salisbury. Public examination December 2nd, at the Guildhall, Salisbury.

W. A. Beaumont, electrical engineer, 44, Warrengate, Wakefield.—Last day for receiving proofs for dividend, November 27th. Trustee, Mr. B. S. Briggs, 13, Burton Street, Wakefield, Official Receiver.

W. R. Mew, wireless and electrical engineer, "Silvermere," Lushington Hill, Wootton, I. of W., formerly of Bembridge and St. Helens, I. of W.—First and final dividend of 8½d. in the £, payable November 24th at 87, High Street, Portsmouth.

H. G. Hayward (Modern Electric Service), electrical engineer and radio dealer, 42, Wilton Avenue, Southampton, lately trading at Cambridge Road, and 186, Bitterne Road, Bitterne Park, Southampton.—Supplemental dividend of 6½d. in the £, payable November 17th at 10, Rockstone Place, Southampton.

Company Liquidations

King, Stringer & Co., Ltd., electrical engineers, &c., Ackway Works, The Hyde, Hendon.—The accounts lodged under the compulsory liquidation of this company show liabilities £14,838 to rank against assets valued at £511, issued capital of £4,950 and a deficiency of £19,277. Mr. G. W. Hutcheson, Assistant Official Receiver, reports that the company was formed in February, 1927, to carry on business as electrical, mechanical and general engineers. The chief object was to exploit an anti-theft device for use on motor cars, which invention was acquired for £1,050 in shares. The motor-owning public proved to be indifferent and sales were very disappointing. By the end of 1929 the directors reached the conclusion that the public were not sufficiently interested to justify their carrying on the business of manufacturing the switch. From the end of 1930 the company was engaged in general engineering work. The company traded at a loss throughout. The failure of the company is attributed by a director to lack of liquid capital which debarred him from making advantageous contracts for the supply of materials, the heavy interest which had to be paid on a bank overdraft and the discounts which he had to allow to the company's customers in order to obtain early payment of their accounts and so acquire ready cash. In the opinion of the Official Receiver there was no justification for continuing once the directors were satisfied that its principal object, the commercial exploitation of the Arkway switch, had failed. Mr. Hugh Fraser, C.A., 17, St. Helens Place, E.C., has been appointed liquidator with a committee of inspection.

Atozed (Kingston), Ltd.—Winding up voluntarily. Liquidator, Mr. D. D. Mathieson, 27, Martin Lane, Cannon Street, E.C.4.

Fylde Radio, Ltd.—Meetings December 14th at 12, Birley Street, Blackpool, to receive an account of the winding-up by the liquidator, Mr. J. W. Westhead.

Private Arrangement

J. E. Crabtree, radio and electrical engineer, 11, Wavertree Road, Liverpool.—At the recent meeting of creditors a statement of affairs was submitted which showed ranking liabilities of £501, of which £346 was due to the trade and the balance of £155 to cash creditors. In addition there were fully secured creditors for £675, who held securities valued at a like amount. The net assets were £121, leaving a deficiency of £380. It was stated that the debtor commenced trading in partnership with another in 1934 at Tunnel Road, Wavertree, and in September, 1935, a branch was opened at Wavertree Road. The partnership was dissolved in February, 1936, the debtor taking over the Wavertree Road shop, and his partner the Tunnel Road concern. Accounts prepared for the year to February, 1937, showed sales of £2,120, with a gross profit of £577, and a net profit of £260, the drawings being £334. The creditors decided that the estate should be administered under a deed of assignment in favour of Mr. E. S. Browne, of North John Street, Liverpool, as trustee, a cash creditor for £60 withdrawing his claim

Electricity Supply

Lighting, Domestic, Power

Aberystwyth.—NEW PLANT.—Application is to be made by the Town Council for sanction to borrow £27,300 for generating station plant in connection with the change-over to a.c.

Ashford (Kent).—LOAN.—Sanction is being sought by the Urban District Council to a loan of £17,000 for the Electricity Department, made up as follows: Mains, £8,000; meters, £3,000; motors, £500; domestic apparatus, £5,000; and assisted-wiring installations, £500.

REQUEST FOR ABOLITION OF FEE.—At a meeting of the Urban District Council it was moved that the fee of five shillings now charged to tenants of Council houses for a change-over from gas to electricity and vice versa should be abolished. The matter was referred to the Housing Committee.

Auchtermuchty.—STREET LIGHTING.—The Town Council has agreed to borrow £300, when required, to meet the cost of installing electric street lighting.

Belgium.—SUBSIDY FOR RURAL ELECTRIFICATION.—The Ministry of Agriculture has announced that it is willing to allow a subsidy to encourage rural electrification. The exact conditions of the subsidy will be governed by the particular local situation.

NEW CONSTRUCTION WORKS.—At the recent annual meeting of the Société Intercommunale Belge d'Electricité the chairman stated that in order to meet the growing demand a new 15,000-kW turbo-generator set was in course of erection at the power station at Sweveghem, and that the new boiler plant at Verviers for the supply of steam to the textile mills in the district was now almost ready. A 70-kV power transmission line had recently been completed between Sweveghem and Mouscron, but it was only being used to transmit power at 10-kV pending the completion of a new sub-station at Mouscron. Orders had been placed for the necessary equipment to effect a 70-kV connection between the company's system at Petit-Rechain with the Beveree-Werister line of the Société des Centrales Electriques de l'Entre-Sambre-et-Meuse. It had also been decided to make a connection between the power station at Monceau and the Quaregnon-Rimiere line of the Société de l'Union Générale Belge d'Electricité, which will necessitate the establishment of a new 150-kV sub-station at Gouy-les-Peton.

Boscastle (Cornwall).—STREET LIGHTING.—At a public meeting convened by the Parish Council to discuss whether there should be electric street lighting it was agreed by a large majority that this method should be adopted.

Cardiff.—FINANCING DEVELOPMENT.—The Electricity Committee has obtained sanction to borrow £50,000 for mains and services and is seeking permission to borrow a further £10,000 for sub-stations.

Cheshire.—CONTROL OF ELECTRICITY UNDERTAKINGS.—That the principle of control of electricity undertakings by local authorities rather than by private enterprise should be adopted was a resolution passed at a recent conference between the Parliamentary Committee of the Cheshire County Council and representatives of Cheshire local authorities. It was also resolved that technical and financial experts should be retained on behalf of the Cheshire local authorities. They will prepare a joint report upon the best scheme or schemes dealing with the whole county.

Clitheroe.—NEW TARIFF.—The Electricity Committee has introduced a new tariff for small-power users as from October 1st last. The charge for the first 1,000 kWh per quarter is 2d. per kWh; for the next 2,000 kWh, 1½d. per kWh; and over 3,000 kWh, 1d. per kWh. Ten per cent. of the energy consumed may be used for lighting at 2d. per kWh where the power consumption exceeds 500 kWh per quarter.

Denmark.—POWER COMPANIES COMBINE.—All the leading d.c. power-producing company of Zealand have been united in a central organisation called Foreningen af Sjaellandske Jaevnstroms Elektricitetsvaerker.

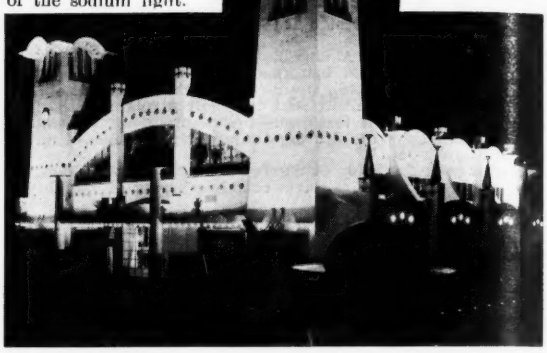
Derby.—POWER STATION EXTENSIONS.—At a meeting of the Town Council last week it was announced that an order had been received from the Central Electricity Board for the installation of a 30,000-kW turbo-alternator and three boiler units at the power station. The work is to be completed by July, 1940.

Finland.—HELSINGFORS.—The consumption of electricity in the Finnish capital has been increasing considerably during the last few years, having risen from 75.7 million kWh in 1934 to 82.8 million kWh in 1935 and 93.4 million kWh in 1936. For the current year consumption is estimated at 107 million kWh. In order to meet the increased demand the municipal electricity works management is to extend the steam plant at Sornas at a cost of 24 million Fmk.

Fleetwood.—BETTER LIGHTING.—Steps are to be taken to improve the street lighting.

Gellygaer (Cardiff).—LOAN.—The Urban District Council has received sanction to the borrowing of £13,500 in connection with the electricity undertaking.

Great Yarmouth.—FLOODLIGHTED PAVILION.—The accompanying illustration shows the Wellington Pier Pavilion floodlighted with ten 150-W "Philora" sodium lamps installed by the Electricity Department. The general effect was striking as the building is covered with "Uralite," painted white, enhancing the value of the sodium light.



The floodlighted Pavilion at Great Yarmouth

EXTENSIONS.—The Electricity Committee is to extend feeders to North Denes estates at a cost of £5,470.

Halifax.—POWER STATION EFFICIENCY.—There was a further improvement in the efficiency of operation of the power station during 1936-37, reports the borough electrical engineer and manager (Mr. G. A. Vowles). The fuel consumption per kWh generated (74.3 millions, against 65.9 millions in the previous year) was 1.546 lb., as compared with 1.638 lb. in 1935-36 and 1.852 lb. in 1934-35. The effect of the increase in the average cost of fuel from 11s. 4d. to 13s. 5d. was thereby reduced from £4,611 to £2,943.

EXPANSION.—Sales of energy increased by 12 per cent. to 55.7 million kWh, despite a reduction in tramway traction supplies, and consumers by 2,616 to 22,456. Per head of the population, sales were 574 kWh, and domestic consumers used on an average 986 kWh, against 928 kWh in the previous year. At March 31st last the total load of cookers, washboilers and water and immersion heaters was 48,885 kW. A

Electricity Supply Legislation

AT the annual meeting of the Provincial Electric Supply Association on November 15th, Mr. S. S. Grant (chairman) said that their company membership had increased by eight. Although their thoughts had been directed principally towards the coming legislation, there had been other work to perform. Following the issue of the "Outline of Proposals" by the Ministry of Transport, based upon the Report of the McGowan Committee, action had been taken upon two lines. One was the preparation of their own representations and suggestions, and the other was consultation with the other company associations, namely, the Incorporated Association of Electric Power Companies and the London Electric Supply Association, to ascertain how far they might be able to proceed in common. Consultation had resulted in the formation of a joint committee representative of practically the whole of the company-operated supply undertakings. The Minister made it clear to the joint committee that the Government was adamant in its resolve to proceed with legislation on the lines of the McGowan Report, and the committee was thus forced to confine itself to comments on the proposals. They had protested against the proposed grouping as set out in the "Outline of Proposals," and it was not the intention to schedule these in detail to the Bill; they would become the subject of discussion at a later date. They had discussed with the authorities the provisions set out in the "Outline of Proposals" which dealt with purchase price; they had considered a possible alternative to the scale of depreciation which it was proposed to apply, and they had insisted throughout that no undertaking should be placed under worse terms as to purchase than those which already obtained under its own Act or Order, and through the medium of the joint committee they had under discussion with the Electricity Commissioners the proposed sliding scale. All kinds of opposition had been offered by electrical interests to the Government proposals, and some had taken a peculiar form. It was a matter of satisfaction so far as their Association was concerned that they had considered their case with a full regard for the position which they occupied in the industry and in a manner which that position demanded. So far their method of approach had gained for them a sympathetic and understanding hearing. The issue would shortly be moved to the House of Commons, and they would need all their strength and resources in what they realised would be the most vital issue that had yet faced the electricity supply industry. The Bill would be presented early in the New Year, and he hoped that the Executive Committee might be able to feel itself assured of the solid support of the whole Association in the action that would have to be taken.

substantial number of installations of electric tubular heaters was carried out during the year, and progress is also noted with regard to electric refrigeration.

Hawes (Yorkshire).—FIRE AT POWER STATION.—It is reported that a fire at the Hawes power station last week resulted in both dynamos being put out of action, depriving Hawes and Gayle of an electricity supply.

Heckmondwike.—PUBLIC LIGHTING.—On November 5th the Chancellor of the Exchequer (Sir John Simon) inaugurated a system of mercury electric-discharge lighting, with "Strowger" centralised control consisting of one transmitter

Sir John Simon switching the new street lighting equipment into service at the electricity works, Heckmondwike

and a number of control switches fitted in the street lamps. Sir John Simon remarked upon the usefulness of this form of control in all normal circumstances and referred also to its particular value on occasions of national emergency. The new lighting is in the High Street area.

Horbury (Wakefield).—ELECTRICITY IN COUNCIL HOUSES.—The Housing and Town Planning Committee has granted permission to thirty-one tenants of Council houses in Sunroyd Hill to have their homes wired for electricity.

India.—THE GANGES GRID.—Further details of the Ganges grid scheme, briefly referred to last week, have been sent to us by our Bombay correspondent. When the power stations at Chitaura and Salawa, in the Muzaffarnagar district, were recently put into operation, Sir William Stampe, who has been in charge of the construction of the grid from the very start, said that the new stations were the fifth and sixth of the series of seven canal-operated installations, and the seventh station was almost complete. The object of the scheme was mainly to supply power for pumping from rivers for canal irrigation, for pumping from State tube wells for local irrigation, and also for operating agricultural machinery on private farms. Its secondary object has been to electrify the eighty-eight towns in the districts. With these objects in view the network has been gradually extended year by year. Two-thirds of the load available is allotted for irrigation pumping, of which the State tube wells absorb 12,600 kW. The average cost per kWh delivered has fallen from 15 pies in 1933 to 11 pies in 1936, and the figure is estimated to fall to 8 pies in 1940. The average cost per kWh generated is 3 pies. In urban areas energy is retailed at fixed rates through licensees who install their own distribution systems. A flat rate of 1½ annas per kWh is charged to minor industries, and special tariffs are quoted for seasonal industries. Investigations are also in progress for the introduction of a reduced scale of charges applicable to off-peak loads. The total cost of the scheme will amount to approximately Rs.348 lakhs. It is satisfactory that during the past two years some net return has been earned as against anticipated losses. The present grid output of 40,000 h.p. is but a fraction of the resources that can ultimately be brought to the aid of cultivation. In the south-eastern districts of the United Provinces the first stage of the eastern grid project is being examined by a technical committee.

Kent.—LIFTS.—At a cost of £1,650 the County Council Assistance Committee proposes to install lifts at the Thanet institution.

Lancashire.—ELECTRO-MEDICAL EQUIPMENT.—The County Council is to install electro-medical equipment at the Whiston Institution, at a cost of £4,239.

Latvia.—PRODUCTION AND CONSUMPTION STATISTICS.—According to a statistical survey recently published the aggregate output of electricity during 1936 was 140.3 million kWh, of which only 5.3 million kWh was produced by water-power plants. At the moment there are twenty-eight hydro-electric stations, thirty-six thermal stations and nine combined steam- and water-turbine plants. The high-voltage network has an aggregate length of 5,893 km. and serves 159,603 consumers, 97,382 of whom are in the capital city of Riga. Industrial consumption last year amounted to nearly 74 million kWh, and that for lighting and other domestic uses to 32.3 million kWh. When the large new Kegums hydro-electric plant is completed the Latvian electricity supply industry will become practically independent of fuel.

London.—REVISED INSTALLATION CHARGES.—In connection with the installation of electricity in houses and flats at Bellingham it was reported to the London County Council last year that the additional weekly charges to be made to the tenants to cover the cost of wiring and upkeep of the installations would be as follows: Two-room and three-room flats, 2d.; three-room houses, 3d.; four-room and five-room houses, 4d. With a view to removing certain anomalies it was found possible, without incurring any loss, to reduce the charge to 3d. a week for all houses having not more than ten points. It has accordingly been decided to revise the charges in respect of the four-room and five-room houses as follows: Four-room houses with a maximum of ten points, 3d.; four-room and five-room houses with more than ten points, 4d.

ELECTRIC COOKERS.—The London County Council Housing Committee has considered a request that the Council should approach the West Kent Electric Co., Ltd., with a view to coming to an arrangement for the provision and installation of electric cookers in the majority of the houses at Mottingham at very little or no extra cost to the tenants. The matter was discussed with the company, but in view of the fact that a very reasonable system of hire-purchase facilities is available to the Council's tenants, in common with all consumers in the company's area of supply, the committee was unable to obtain any offer of preferential treatment in the case of the Council's tenants.

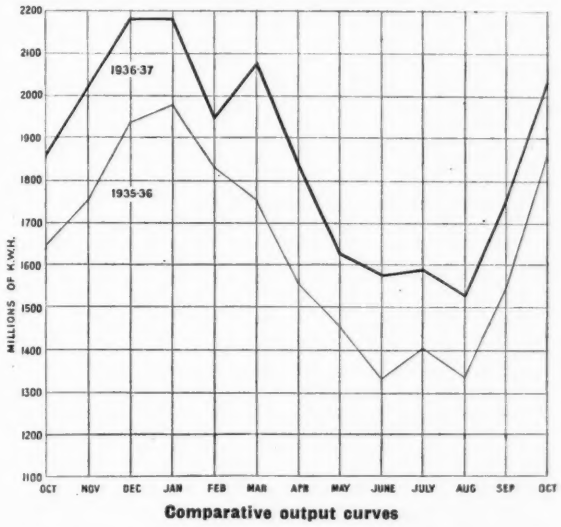
LAMBETH.—The London County Council is to install electric pumps at an estimated cost of £485 in connection with the water supply at the hospital.

Newcastle-on-Tyne.—OPTION TO PURCHASE POSTPONED.—The City Council has agreed to a recommendation of the Parliamentary Committee, referred to last week, to postpone for two years its option to acquire the undertakings, within the city area, of the North-Eastern Electric Supply Co., Ltd., and the Newcastle and District Lighting Co., Ltd.

Newcastleton (Roxburgh).—On July 26th the Dumfries County Council was granted an Extension Order covering the parish of Castleton, in Roxburgh. Since then it has extended its mains by the erection of eight miles of 11-kV overhead line to Newcastleton, in the extended area. Supply to this area was inaugurated on Saturday last, the switching-on being

Generation of Electricity in October

THE official returns rendered to the Electricity Commissioners show that 2,029 million kWh of electricity was generated by authorised undertakings in Great Britain during October, as compared with the revised figure of 1,861 million kWh in the corresponding month of 1936, representing an increase of 168 million kWh, or 9.0 per cent. The number of working days in the month (*i.e.*, excluding Sundays) was twenty-six as against tweny-seven last year.



Comparative output curves

During the first ten months of 1937 up to the end of October the total quantity of electricity generated by authorised undertakings was 18,120 million kWh, as compared with the revised figure of 16,031 million kWh for the corresponding period of 1936, representing an increase of 2,089 million kWh or 13.0 per cent.

performed by the Duke of Buccleuch at a ceremony in the Mechanics' Hall. Members of the Dumfries and Roxburgh County Councils, the Mayor of Carlisle, and members of the Border Rural District Council, Cumberland, were present. After the switching-on ceremony the Duke went to the electricity sub-station and switched on the street lighting and some special flood and decorative lighting which had been fixed up for the occasion by the Dumfriesshire engineer. An electrical exhibition with demonstrations continued daily until Wednesday. The Dumfries County Council has during the past few years covered its own supply area with a comprehensive rural scheme which has shown some remarkably successful results, and it is expected that similar development will now take place in the added area—an extremely rural part of Southern Scotland. Under the terms of a Fringe Order a supply is also to be given to the Ministry of Labour Instructional Centre at Kershopefoot, which is on the English side but only a few yards over the border.

New Zealand.—POWER RESOURCES.—Preliminary statistics of electricity supply in New Zealand show that the Government systems, which generated 83 per cent. of the power supplies during the year ended March 31st last, are nearing their maximum output. However, works in progress on the North Island system, together with future extensions authorised for the South Island system, should provide sufficient generating plant to cope with potential demands. The statistics, which show many record levels, do not cover the operations of the North Auckland Electric Power Board, as this authority was operating during only three months of the period under review. Among notable increases were one of over 110,000,000 in kWh generated; a revenue increase, excluding rates, of little short of £300,000, the total revenue received now exceeding £5,000,000; an increase in retail consumers of 15,048; and increases in ranges, water-heaters and milking machines of 8,953, 8,185 and 2,425 respectively. Another point of interest is the upward tendency shown in the average number of kWh sold per consumer, indicating more intensive development.

Paignton.—PROMENADE LIGHTING.—A scheme is to be prepared for lighting on the Preston sea front.

Peterborough.—PUBLIC LIGHTING.—The City Council has received sanction to a loan of £5,000 for prospective expenditure on public lighting.

POWER STATION REPAIRS.—The sum of £8,950 is to be expended in connection with the repair of a turbine at the power station. The cost will be borne by the Central Electricity Board.

Plymouth.—EXTENSION OF AREA.—The City Council last week decided to promote a Bill in the 1937-38 Session of Parliament with the object of extending the city and the electricity supply area by the inclusion of parts of the Plympton St. Mary rural district.

Poland.—WATER-POWER SCHEME.—The Department of Public Works is to erect three large hydro-electric stations on the Rivers Dunajec, Sola and San, designed for outputs of 10,000, 20,000 and 30,000 kW, respectively. Erection will be commenced next spring, and the stations are scheduled to be completed by the end of 1939.

Richmond (Yorkshire).—COUNCIL REJECTS COMPANY'S TERMS.—The Rural District Council has refused to pay a charge of 30s. per house proposed by the North-Eastern Electric Supply Co., Ltd., to supply electricity for lighting in ten houses at Melsonby. The Ministry of Health wrote that it was not the practice of undertakings to charge for this work, but if the Council were satisfied that the charge was justified the Minister would raise no objection.

Rochford (Essex).—OVERHEAD LINES.—The Rural District Council is to raise no objection to proposals by the County of London Electric Supply Co., Ltd., to erect overhead distributing lines in the district.

Russia.—ELECTRICAL PROGRESS.—The total capacity of power stations in 1936 was 7,500,000 kW; in 1913 it was 1,100,000 kW. The annual output of electricity has increased in the same period from 1,900 to 32,800 million kWh.

DNIEPR HYDRO-ELECTRIC STATION.—October 10th completed the fifth year since the Dniepr hydro-electric power station Dnieproges was put into operation. Its present capacity is 434,000 kW, which will be increased next year to 558,000 kW. During the five years that the station has been in existence it has produced 8,000 million kWh. The Dniepr station supplies power to industrial combines on the left bank of the river.

100,000-KW GENERATOR.—A 100,000-kW set is being installed at the power station at Stalinogorsk and is expected to be in operation early next year.

Seaton Valley (Northumberland).—SUPPLY EXTENSIONS.—Electricity is to be supplied to 314 houses on the Park estate, Shiremoor, and 72 houses at Holywell Village, Seaton Delaval.

Sheffield.—COAL SUPPLIES.—Authorities who have watched the action taken by the Electricity Committee with regard to the quality and supplies of coal will gather little comfort from the findings of the Midland (Amalgamated) District Committee of Investigation. Sheffield complained that the quotations for coal for the year ending August were unfair, that much of the coal was of low quality and unsuitable, and that the quota for the district was insufficient for individual collieries to offer adequate supplies. The Investigation Committee, it is stated in the minutes of the Electricity Committee to the City Council, has found against the complainants on all points at issue. It is not anticipated that the Corporation will take any further action in the matter.

Stanley (Co. Durham).—ELECTRICAL DEVELOPMENT.—Improvements to the supply system at Annfield Plain are to be carried out by the Urban District Council at an estimated cost of £2,500.

Sunderland.—ASSISTING CONSUMERS.—The Town Council is to spend another £20,000 on apparatus for selling on hire-purchase terms, and assisted wiring.

Sweden.—CONTROL OF POWER TARIFFS.—The Board of Trade, through a special permanent committee of five members, has been authorised to control power prices. Producers cannot appeal against the rulings of the committee.

Tasmania.—HYDRO-ELECTRIC COMMISSION.—In presenting their report for the year ended June 30th, 1936, the Commissioner (Mr. W. E. Maclean) and Associate Commissioners (Messrs. C. B. Davies and J. E. Heritage) point out that this and the relevant statements were forwarded to the Auditor-General on September 9th, 1936, but that his certificate was not received until May 28th, 1937, a delay which they feel has resulted in the report losing all its value except perhaps for record purposes. The period under review is described as an exceptionally busy one. The monthly average employment figures for construction work of all kinds were 1,484. The selection of reliable and experienced workmen became more difficult during the latter part of the year, but in general the labour force was good. The lack of competent foremen and gangers at Tarraleah was gradually overcome by the promotion of men showing special aptitude. The position was more difficult in the construction of the West Coast transmission line because the necessity for the earliest possible completion involved the employment of an exceptionally large number of men working in very rugged country under adverse weather conditions and in widely separated gangs. The Commissioners state that increased demand is the keynote of this year's work. Although they are making every possible effort to meet the requirements of consumers, they are hard pressed and cannot satisfy the requests in full. By courtesy of the Electrolytic Zinc Co. the peak periods are relieved by reduction, when necessary, on the company's sub-station, and the lost kWh are made up during off-peak periods. The machinery at the Waddamana power station has functioned well, and a non-stop year is recorded. The Shannon station is settling down to continuous work. The system peak is given as 60,700 kW with a system load factor of 82 per cent., the kWh generated being 436 millions, an increase of 51 millions over the previous year. The supply to the Electrolytic Zinc Co. during the year amounted to 288 million kWh.

Troon (Ayrshire).—STREET LIGHTING.—The Town Council has entered into an agreement with the Ayrshire Electricity Board for lighting streets of the burgh by electricity. The approximate cost is £3,200. It is hoped to have the work completed within the next eighteen months. The Council is also to proceed immediately with a scheme for the installation of electricity in the North Shore housing area.

Wallsend.—CABLES.—Plans have been approved for the laying of cables in Ravensworth Street, West Street, Mutual Street, and Rochdale Street by the North-Eastern Electric Supply Co., Ltd.

West Hartlepool.—ASSISTED WIRING.—Application is to be made for sanction to borrow £5,000 for consumers' assisted-wiring installations. The Town Council has agreed in future to carry out assisted-wiring schemes in connection with electricity supply to houses by direct labour. A deputation from local electrical contractors has protested against the decision, but the Council is to adhere to it.

Weymouth.—MAINS AND SERVICES.—Sanction is being sought by the Electricity Committee to a loan of £30,000 for mains and services and £5,000 for meters.

Traction

Brighton.—TRANSPORT BILL.—An important provision of a Parliamentary Bill which the Town Council on Tuesday decided to promote is the introduction of trolley-buses. The new Bill is intended to carry into effect a provisional pooling agreement which has been reached between the Corporation and the Brighton, Hove and District Omnibus Co.

Ipswich.—TROLLEY-BUS PROPOSALS.—The Corporation intends to apply to the Minister of Transport on or before December 23rd for a Provisional Order empowering it to provide trolley-bus services along three additional routes.

Southern Railway.—ELECTRIC LOCOMOTIVE RESEARCH.—Mr. G. S. Szlumper, the new general manager, recently stated that research work in connection with electric locomotives was actively in hand, and it was hoped that before long there would be put on the rails an electric locomotive of which great things might be expected, and which would enable the company to view from an economic standpoint electrification still further afield.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Ashford (KENT).—December 6th. U.D.C. Electricity Department. Kiosk and one 100-kVA transformer. (See this issue.)

Australia.—MELBOURNE.—December 14th. State Electricity Commission of Victoria. 22,000-V, compound-filled, unit-type switchgear and accessories. (T.Y. 27686/37.)* Five three-phase, totally enclosed, oil-immersed, self-cooled reactors. (T.Y. 27849/37.)*

December 7th. Instrument transformers. (T. 27958/37.)*

December 21st. 22,000-V switchgear and accessories. (T.Y. 28275/37.)*

Birmingham.—November 29th. Electric Supply Department. Meters. (See this issue.)

Bootle.—November 23rd. Watch Committee. Street lighting. (November 5th.)

Bridlington.—December 4th. Town Council. 11-kV ring-main switchgear equipment, l.v. a.c. distribution panel and one 300-kVA and one 200-kVA transformers. (See this issue.)

Chorley.—November 22nd. Borough Council. Vertical spindle centrifugal sludge pump and electric motor. Borough Engineer's Office, Town Hall.

Colwyn Bay.—November 23rd. Electricity Department. E.h.v. and l.v. cables and sub-station equipment. (November 5th.)

Dumfries.—November 22nd. County Council. Electrical heating apparatus at the Greenknowe section of the Annan Academy. County clerk, County Buildings.

East Grinstead.—December 1st. U.D.C. Twelve months' supply of electric cookers, water storage heaters, immersion heaters and circulators. (See this issue.)

Erith.—December 7th. U.D.C. Electricity Department. Switchgear, transformers and metering equipment. (See this issue.)

Essex.—November 26th. General Purposes Committee. Electrical installation at the County Hall, Chelmsford, extensions. (November 5th.)

Great Yarmouth.—December 6th. Borough Council. Switchgear. (November 5th.)

Hastings.—December 2nd. Borough Council. One year's supply of poles, stay blocks, &c., transformers and galvanised steelwork, bolts, &c., for overhead lines. (November 12th.)

Holmfirth (YORKSHIRE).—November 29th. U.D.C. Electrically driven booster pumping set, in duplicate, for 6,000-gal. per hr., against a head of 115 to 185 ft., with all switchgear and accessories. S. G. Dilmot, clerk, Council Offices (deposit £3).

Huddersfield.—November 25th. Corporation. Installation of electric plugs in 203 houses on the Rawthorpe housing estate. Borough Engineer's Office, High Street Buildings.

India.—MADRAS.—December 22nd. Electricity Department. Equipment in connection with the change-over of the Pykara-Coimbatore section of the Pykara hydro-electric development scheme from 66-kV to 110-kV operation. (T. 28193/37.)*

Inverlochy (FORT WILLIAM).—November 29th. Inverlochy Society, Ltd. Electrical work in connection with 150 houses. Resident architect, Estate Office, Inverlochy Village (deposit £1 1s.).

Irish Free State.—CORK.—Board of Management of the South Infirmary and County Hospital. Electric lighting and power at the Hospital. J. F. McMullen, architect, 30, South Mall (deposit £10).

Leeds.—November 22nd. Markets Committee. Electric lighting installation for omnibus shelter, waiting room and lavatory accommodation at St. Peter's Street. J. E. Acfield, city engineer, Civic Hall.

Llandudno.—November 20th. U.D.C. Pumping plant, consisting of multi-stage centrifugal type pumps and electrical machinery for two pumping stations. Engineer, Town Hall.

London.—ST. MARYLEBONE.—November 23rd. Borough Council. Transformers and switchgear. (November 12th.)

METROPOLITAN WATER BOARD.—December 30th. Three d.c. switchboards at the Hampton pumping station. Chief engineer, Room 235, 173, Rosebery Avenue, E.C.1 (deposit £2 2s. to the comptroller to the Board).

Manchester.—November 25th. Electricity Committee. Twelve months' supply of electric water heaters. (November 12th.)

Middlesex.—December 2nd. County Council. Electrical installation at elementary school. (November 5th.)

December 13th. Installation of electric lighting and power, &c., at the Redhill County Hospital, Edgware. (See this issue.)

December 16th. Electrical installation at the new senior elementary school, Wilmer Way, Southgate. (See this issue.)

New Zealand.—WELLINGTON.—December 1st. Stores Control Board. Two steam engine- or turbine-driven alternators, switchgear, electric motors and one motor-driven centrifugal pump. (T.Y. 20412/37.)*

November 23rd. Public Works Department. 110-kV air-break switches, with fuses, blades and contacts. (T.Y. 20930/37.)*

January 11th. Ten sets of outdoor-type enclosed switchgear. (T.Y. 27781/37.)*

January 25th. 500 galvanised steel transmission line towers. (T.Y. 20857/37.)*

February 1st. Seven 1,000-kVA, oil-immersed, self-cooled, single-phase, outdoor type transformers and accessories. (T.28013/37.)* (T.28019/37.)*

January 25th. Post and Telegraph Department. Single conductor cable. (T. 28259/37.)*

CHRISTCHURCH.—December 7th. Electricity Department. Two three-phase automatic voltage regulators. (T.Y. 20936/37.)*

Reigate.—November 22nd. Borough Council. One 11-kV, three-phase switchboard and two 300-kVA transformers. (November 5th.)

Sheffield.—December 8th. Electricity Committee. Three water tube h.p.-steam boilers, with all associated equipment. (November 12th.)

Sleaford.—November 29th. U.D.C. Electricity Department. Twelve months' supply of l.v. p.i. cables and a.c. and d.c. meters. (November 12th.)

South Africa.—CAPETOWN.—November 24th. Electricity Department. Electric lighting poles, c.i. pole bases and overhead line material. (T.Y. 20633/37.)* Cables. (T.Y. 27539/37.)* (T.Y. 27790/37.)*

DURBAN.—December 3rd. City Electrical Engineer's Department. 6,600-V switchgear. (T.Y. 27533/37.)*

December 10th. 6,600-V switchgear. (T.Y.28179/37.)*

JOHANNESBURG.—December 11th. Electricity Department. H.v. circuit-breakers, with instruments and transformers, relays, control panels, &c. (T.Y. 27733/37.)*

BRITSTOWN.—November 29th. Municipality. Plant, equipment and materials required for inaugurating an electricity supply undertaking. (T. 27792/37.)*

PRETORIA.—December 9th. Public Works Department. Electrically driven laundry machinery. (T.Y. 27797/37.)*

December 16th. Electric passenger lift. (T.28188/37.)*

HANOVER (CAPE PROVINCE).—December 1st. Municipality. Plant equipment and materials required for inaugurating an electricity undertaking. (T.28177/37.)*

Stockport.—November 22nd. Electricity Committee. One 5-cwt. electric van. (November 12th.)

Swansea.—November 29th. Borough Council. 33,000-V oil-filled and compound-filled switch units. (November 5th.)

Uruguay.—MONTEVIDEO.—November 24th. State Electricity Supply and Telephones Administration. H.v. armoured cable. (T.Y. 27632/37.)*

December 14th. H. and l.v. armoured cables. (T.Y. 27630/37.)*

December 20th. Electrical materials, including insulators, cut-outs, fuses, switches, lampholders, &c.. (T.Y. 27631/37.)*

West Ham.—November 29th. Borough Council. Twelve months' supply of p.i. cables. (November 5th.)

West Hartlepool.—November 20th. Borough Council. Two 5/7 cwt. electric vehicles. (November 5th.)

West Midlands. — November 30th. Joint Electricity Authority. Transformers, and 33,000-V interconnecting mains. (November 5th.)

West Riding.—November 29th. County Council. Electric lighting at Batley Boys' Grammar school, Mexborough Secondary School, Mirfield Grammar school, Rawmarsh Senior Council school and Wombwell Senior Council school. Education officer, County Hall, Wakefield.

Weymouth and Melcombe Regis.—November 22nd. Electricity Department. Meter test room equipment. (November 5th.)

Wick.—November 27th. Town Council. Electric lighting at sixty houses. Burgh surveyor (deposit £2 2s.).

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Coulsdon.—Highways Committee. Accepted. Illuminated bollards.—Revo Electric Co.

Darlington.—Town Council. Accepted. Station transformer.—Yorkshire Electric Transformer Co. Switchgear and control equipment.—A. Reyrolle & Co.

Dunfermline.—Town Council. Accepted. Electric lighting in forty-two houses on the Parkneuk Road estate (£434).—A. S. Addison & Co.

Essex.—County Council. Accepted. Electrical renewals at the Institution, Stanway (£510).—H. E. Gosnell.

Glasgow.—Electricity Committee. Accepted. Eighteen 800-kVA and eighteen 400-kVA transformers (£12,172).—Bruce Peebles & Co.

Health Committee. Accepted. Electrical work at Mount Blow Country Home extension (£341).—A. Ritchie. Heating installation at the Hawkhead Mental Hospital: Electrode boiler (£305).—Bastian & Allen. Switchgear (£68).—M. & C. Switchgear, Ltd. Cable (£108).—Johnson & Phillips.

Gravesend.—Highways Committee. Recommended. Traffic signals (£1,065).—Automatic Telephone & Electric Co.

Renfrew.—County Council. Accepted. Electric lighting in twenty-three blocks of houses and eight houses at Kilmacolm.—Kennedy Stark & Co.

London.—L.C.C.—Accepted. Wiring and fittings for electric lighting in blocks 1 and 3 of dwellings at Coventry Cross estate and blocks 5, 6 and 9 of dwellings on the Bow Road site, Poplar (£1,992).—Buchanan & Curwen. This was the lowest of nine tenders, the highest being £2,782. Wiring and fittings for electric lighting, &c., in block 3 of dwellings on the Peckham Rye site, Camberwell (£904).—J. L. Shadwell. This was the lowest of ten tenders, the highest being £1,738. Wiring and fittings for electric lighting, &c., in block 3 of dwellings on the Chicksand Street area, Stepney (£400).—Jacob White & Co. This was the lowest of ten tenders, the highest being £545. Wiring and fittings for electric lighting, power, clocks, telephones, radio and patients' signalling system in the new maternity block, Lambeth Hospital (£1,842).—L. G. Tate & Co.

This was the lowest of twelve tenders, the highest being £2,650. Two electric bed lifts at St. Gilés' Hospital, Camberwell, and Paddington Hospital (£2,829).—Express Lift Co. Electrical fittings.—Electric & Ordnance Accessories Co.; Falk, Stadelmann & Co.; G.E.C.; Samuel Heath & Sons; Hornby Electrical Supplies Co.; Horobin, Ltd.; India Rubber, Gutta Percha & Telegraph Works Co.; McEchern & Co.; Sloan Electrical Co.; Sperryn & Co.; J. H. Tucker & Co.; Wandsworth Electrical Manufacturing Co.

Portsmouth.—Electricity Committee. Accepted. Cable.—Johnson & Phillips; Edison Swan Cables.

Sunderland.—Town Council. Accepted. Electric cables.—B.I. Cables; Edison Swan Cables; Hackbridge Cable Co. Meters.—Ferranti; British Sangamo Co.; Chamberlain & Hookham.

West Hartlepool.—Town Council. Accepted. Reconstruction of the overhead equipment in connection with the trolley-bus route between Newburn Gardens and Lawson Road, &c.—Clough, Smith & Co.

Weymouth.—Electricity Committee. Accepted. Cable at Chickeril (£1,133).—District Transmission Lines, Ltd. Kiosk and switchgear (£1,022).—English Electric Co.

Forthcoming Events

Institution of Electrical Engineers.—Monday, November 22nd. Institution, London, W.C.2. 7 p.m. Informal meeting. Discussion on "Recent Developments in Electric Welding." To be opened by Mr. J. A. Dorrat. Thursday, November 25th. Institution, London. 6 p.m. Second Parsons Memorial Lecture. "Scientific Activities of the Late Sir Charles A. Parsons." Dr. G. Stoney.

Meter and Instrument Section.—Friday, November 19th. Holborn Restaurant, London, W.C.1. 6.45 for 7 p.m. Annual dinner.

Mersey and North Wales (Liverpool) Centre.—Monday, November 22nd. Adelphi Hotel, Liverpool. Annual dinner.

North Eastern Centre.—Monday, November 22nd. The Newe House, Newcastle-on-Tyne. 6.15 p.m. Discussion on "Electrical Engineering Education." To be opened by Prof. C. L. Fortescue, Col. H. C. Fraser and Mr. F. H. Clough.

North Midland Centre.—Tuesday, November 23rd. Hotel Metropole, Leeds. 7 p.m. "Rural Electrification." Mr. J. S. Pickles.

Scottish Centre.—Tuesday, November 23rd. Grosvenor Restaurant, Glasgow, C.2. 6.30 for 7 p.m. Annual dinner.

Wireless Section.—Tuesday, November 23rd. Institution, London, W.C.2. 6.30 p.m. Informal meeting. Discussion on "Electrical Gramophone Reproduction." To be opened by Mr. H. L. Kirke.

West Wales (Swansea) Sub-Centre.—Thursday, November 25th. Technical College, Swansea. 6.30 p.m. Address by Mr. H. G. Weaver, chairman of the Western Centre.

South Midland Centre.—Friday, November 26th. Grand Hotel, Birmingham. 6.30 for 7 p.m. Annual dinner.

Tees-Side Sub-Centre.—Friday, November 26th. Linthorpe Assembly Rooms, Middlesbrough. Annual dance.

Association of Supervising Electrical Engineers.—Friday, November 19th. Grosvenor Hotel, Manchester. 7.30 p.m. "Hot-pot" supper. Wednesday, November 24th. Magnet House, Kingsway, London, W.C.2. 7.15 p.m. Joint meeting with the Institution of Engineers-in-Charge. "Cold Cathode Tube Developments." Mr. T. L. Collins. Thursday, November 25th. Aldwych House, Aldwych, London, W.C.2. 6.45 for 7 p.m. Informal meeting. "Faults on A.C. Motors." Mr. J. P. Crossley.

Electrical Trades' Commercial Travellers' Association.—Friday, November 19th. Criterion Restaurant, London, W.1. 6.30 for 7 p.m. Annual dinner-dance.

Junior Institution of Engineers.—Friday, November 19th. 39, Victoria Street, London, S.W.1. 7.30 p.m. "Recent Technical Developments in the Art of Recording Sounds in Motion Pictures." Mr. W. Harris.

Association of Mining Electrical Engineers (*South Wales Branch*).—Saturday, November 20th. 3 p.m. Visit to the Cardiff Engineering Exhibition.

Birmingham Electric Club.—Monday, November 22nd. Grand Hotel, Birmingham. 7 p.m. "The Creation of a Modern Power Station." Mr. F. W. Lawton.

Radio Manufacturers' Association.—Monday, November 22nd. Savoy Hotel, London, W.C.2. 7 for 7.30 p.m. Annual banquet and ball.

Batti Wallahs' Society.—Tuesday, November 23rd. Hotel Victoria, London, W.C.2. Luncheon. Lecture on "Lighting Developments in U.S.A." Mr. W. J. Jones.

Electrical Contractors' Association (*Manchester Branch*).—Tuesday, November 23rd. Midland Hotel, Manchester. Annual dinner.

Electrical Industries' Benevolent Association.—Tuesday, November 23rd. Grosvenor House, London, W.1. 8.30 p.m. Supper-dance.

Institution of Post Office Electrical Engineers.—Tuesday, November 23rd. C.T.O. Building, St. Martin's-le-Grand, London, E.C.1. 5.30 p.m. Informal meeting. "The Selection of Workmen for Post Office Recruitment or Promotion." Mr. R. W. Palmer.

Institute of Metals.—Wednesday, November 24th. Thames House, Millbank, London. 7.30 p.m. Supper-dance.

Institution of Engineers-in-Charge.—Wednesday, November 24th. Magnet House, Kingsway, London, W.C.2. 7.15 p.m. Joint meeting with the A.S.E.E. (See above.)

Electrical Power Engineers' Association (*Northern Division*).—Thursday, November 25th. Geographical Hall, Parsonage, Manchester. 7.15 p.m. Annual general meeting. Address by Mr. H. J. Cox, the president.

South Coast Section.—Saturday, November 27th. Kimbell's Café, Southsea. 6.30 p.m. Annual dinner and dance.

Notes

Electrical Engineers' Ball

The Electrical Engineers' Ball for 1938 will be held at Grosvenor House, Park Lane, W, on Friday, February 11th, the day after the annual dinner of the Institution of Electrical Engineers. The details are being settled by the Executive Committee which is doing all it can to ensure the comfort of guests, both as regards dancing and supper. Tickets will be one guinea each and will be obtainable as usual from members of the General Committee. Any surplus remaining after defraying the cost of the Ball will be handed over to the I.E.E. Benevolent Fund.

Electricity in German Mines

In a recent issue of *Elektrotechnische Zeitschrift* Herr E. Schulze gives a summary of the latest regulations of the Verband Deutscher Elektrotechniker relative to the use of electricity in mines. They provide for a maximum of 6,000 V for power purposes, 500 V for electric coal cutters and 220 V for lighting. In order to provide for easy supervision all cables must be carried along the mine walls in a visible position, the number of supporting points varying in accordance with the degree of slope of the galleries. All cable connections must be either welded or screw-bound. Transformers and oil switches must be enclosed in special compartments having fireproof doors. In portable or mobile installations only is the use of "dry" transformers permitted. All apparatus must be of armoured type able to withstand any crushing effect and all metallic casings must be "unbreakable." Lighting current is limited to 15 A d.c. and to 25 A a.c. The use of wood, marble or slate as insulating material is only allowed when they are immersed in oil.

A Street Lighting Conference

A conference arranged by E.D.A. and E.L.M.A. to interest those concerned in the administration of public lighting was held on Wednesday at Lincoln. Lectures were given by Messrs. N. L. Harris and C. R. Bicknell dealing with the fundamental principles of the subject in as non-technical a manner as possible and the subsequent discussions dealt with its economic aspects. Mr. Harris demonstrated the development of electric lamps from the carbon-filament type to the 80-W h.p. mercury-vapour lamp with quartz tube and the difference between the spectra and operating characteristics of a filament and discharge lamps. He discussed the nature of permanent and non-permanent inert gases (the latter requiring replenishment) and the use of metallic vapours with the power to give new colours and increased luminous efficiency. A water-cooled high-intensity discharge lamp for projectors was exhibited in operation and experiments were conducted showing the higher efficiency and better colour rendering obtainable by the use of fluorescent powders. Mr. Bicknell outlined the principles and applications of street lighting to modern traffic conditions, emphasising the varying needs of different classes of user, illustrating by lantern slides how installations must be designed to fulfil needs that often conflicted. During the evening there was a tour of inspection of the streets lighted by mercury discharge lamps, of from 80 to 400 W with varying mounting heights and spacing.

E.A.W. Activities

A Thames Valley Branch of the Electrical Association for Women is to be inaugurated on November 26th at the Zeeta Café, Kingston-upon-Thames. The chief speakers at the inaugural meeting will be Miss Caroline Haslett, Mr. J. Beauchamp (late Central Electricity Board), Mr. F. W. Purse (London & Home Counties J.E.A.), Mr. E. J. Jarvis (Kingston-upon-Thames Electricity Department) and Mrs. Kemsley, the prospective chairman of the new branch. Mrs. Byrne is to act as secretary.

Appointments Vacant

Probationary inspector in the Engineering Department of the Post Office.

Assistant mains engineer for Aylesbury Electricity Department.

Principal technical officer in the Admiralty Technical Pool.

Mains and change-over engineer for Aberystwyth Electricity Department.

Meter test engineer for Southwark Borough Council.

Meter tester for Fareham Electricity Department.

Control engineer for Watford Electricity Department

(See our Classified Advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

ELECTRIC metal bracket fittings.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. L. Jessop, governing director of Jessop & Boydell, Ltd., electrical engineers and contractors, of Bradford, has been appointed deputy Lord Mayor of Bradford for the current municipal year. Mr. Jessop, who is a member of the Electrical Contractors' Association, has been a member of Bradford City Council since 1925. He serves on the Electricity Committee.

Councillor E. R. Canning, chairman and managing director of W. Canning & Co., Ltd., was elected Lord Mayor of Birmingham on November 9th. A native of Binton, in Warwickshire, Mr. Canning is sixty-one years of age. He was educated at King Edward Grammar School, Aston. Taken into partnership by his elder brother, Mr. T. R. Canning, in 1902, he became the sole proprietor of W. Canning & Co. when his brother retired in 1918. Two years later the concern was turned into a limited company, with himself as chairman and managing director. The business, under various owners, has been in existence nearly 150 years, and fifty years ago it was one of the pioneers of nickel plating. Remarkable progress has been made during the last fifteen years, especially since the introduction of chrome plating. Mr. Canning was elected to the Council in 1930, and has been the city's "Chancellor of the Exchequer" for three years. Other committees of which he is a member include the General Purposes, Rating and Valuation, and Salaries and Wages and Labour.

The new **Lord Mayor and Lady Mayoress of Birmingham**

Mr. P. H. Goddard

Mr. P. H. Goddard, who was elected to the Rugby Borough Council on November 1st, is a sales engineer in the Industrial Sales Department of the British Thomson-Houston Co., Ltd. He was in the Power Department of the Newcastle-upon-Tyne branch of the company for some years, and was for a period with the Cardiff branch.

Prof. Mario Giandotti, head of the Dams Department of the Italian Higher Council of Public Works, has recently been elected president of the International Commission of Large Dams, in succession to Monsieur G. Mercier.

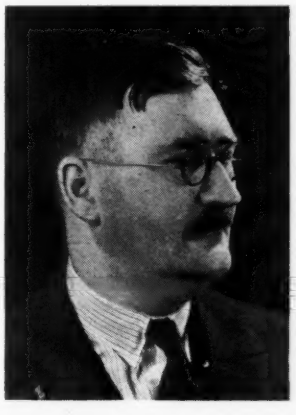
Mr. R. B. Waterson has been appointed a member of the South African Electricity Supply Commission for a period of three years.

With reference to the announcement in our last issue relating to the appointment of **Mr. R. B. Whittick** as London agent for G. P. Dennis, Ltd., the company points out that Mr. Whittick is an additional London agent. **Mr. H. H. Leage,** 46, Lincolns Inn Fields, W.C.2, who has been with the company since 1928 remains London agent. Mr. Whittick's appointment has become necessary owing to the growth of the company's business in the London area.

Under an Order in Council dated February 6th, 1928, the Lord President of the Council has appointed **Lord Riverdale,** of Sheffield, to be chairman of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research in succession to the late Lord Rutherford. Under the same Order in Council the Lord President has appointed **Sir William H. Bragg** to be a member of the Advisory Council.

Mr. E. R. L. Fitzpayne, who, as we recently announced, was selected for the appointment of deputy transport manager to Glasgow Corporation, has now had his appointment confirmed by the Corporation. The salary is £1,000, rising to £1,250.

Mr. E. T. Hippisley, M.A. (Cantab.), the author of the article on the trolley-bus on page 703 of this issue, is manager of traction sales to the British Thomson-Houston Co., Ltd., with whom he has been since 1920. He was a King's Scholar at Westminster School and later studied at Trinity College, Cambridge. During the war he served with the Royal Engineers and Royal Artillery. Mr. Hippisley is an associate member of the Institutions of Electrical and Mechanical Engineers and a member of the Institute of Transport.



Mr. E. T. Hippisley

Alderman T. J. Gooding, chairman of the Leicester Corporation Transport Committee, has been chosen as one of the two representatives of the Midland Association of Municipal Tramways and Transport to the National Joint Industrial Council for the Road Passenger Transport Industry. The other representative is **Mr. A. C. Baker,** general manager of the Birmingham Corporation Transport Department.

Mr. H. Pouncey

Mr. H. Pouncey, a superintendent in the Electrical Department of the Newcastle-upon-Tyne Corporation Transport Department, is retiring on November 20th after thirty-six years' service. When the Corporation changed over from horse-drawn cars to electrically propelled vehicles Mr. Pouncey was one of the first men to wire, equip and drive a tramcar. He was previously with the British Thomson-Houston Co., and was engaged in the installing of trams in London, Stockton, Motherwell, Liverpool, Sheffield and Swansea.

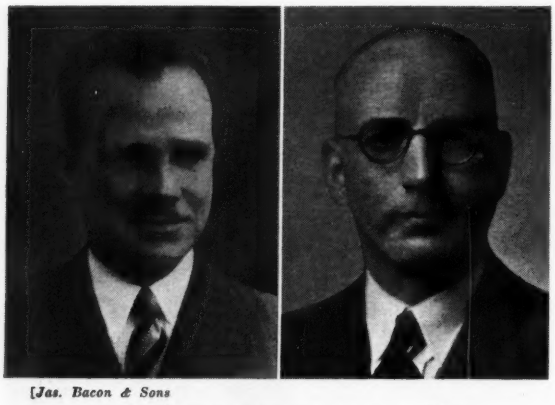
Mr. F. S. Ette has been nominated for the presidency of the Birmingham Electric Club for 1938.

Mr. H. L. Walker has joined the Hotpoint Electric Appliance Co., Ltd., and will be responsible for the organisation of that company's washing-up machine business. Mr. Walker, who will be at the company's head office in London, was for fourteen years with Parkinson & Cowan, Ltd., and for a short time he was with Joseph Lucas, Ltd. He was closely associated wth the first installations of the Hotpoint Company's washing-up machines in this country. He has a number of inventions to his credit.

Mr. H. L. Walker

Mr. T. R. Evans has been appointed electrical engineer and manager of the Rhondda Urban District Council's electricity undertaking in succession to Mr. J. M. Bowman, who is retiring at the end of the year. Mr. Evans has been chief assistant engineer to Mr. Bowman for twenty-three years.

Mr. D. Maxwell Buist, who for the past eight years has been the Central Electricity Board's district manager for North East England, has resigned in order to take up an important appointment with the British Electrical & Allied Manufacturers' Association on January 1st. The Board has appointed **Mr. E. J. Edgar** to fill the vacancy. Mr. Buist, who took up his appointment with the Central Electricity Board in 1930, served with the R.A.F. during the war. He was for four years technical assistant to the city electrical engineer of Edinburgh, following which he became personal assistant to Major H. Bell, who was then city electrical engineer at Hull. Mr. Buist left Hull five years later to become chief electrical engineer of Imperial Chemical Industries, Ltd., at Billingham-on-Tees, where he remained for two and a half years, leaving there to join the Central Board. He was chairman of the North-Eastern Centre of the I.E.E. for 1936-37. Mr. Edgar, who has been the Board's operation engineer for the South West England and South Wales Area since 1932, received his technical education at the Manchester College of Technology and served his apprenticeship in Manchester with Beyer & Peacock, and with the Lancashire Dynamo & Motor Co. (now Lancashire Dynamo & Crypto, Ltd.). On completing his war service, he returned to a post with the Cleveland & Durham Electric Power Co., and subsequently held appointments with the Newcastle-on-Tyne Electric Supply Co. and the Belfast Corporation Electricity Department. For five years prior to his appointment with the Central Electricity Board Mr. Edgar held the post of chief engineer with the Shanghai Power Co. He is an associate member of the I.E.E.



[*Jas. Bacon & Sons*

Mr. D. Maxwell Buist and Mr. E. J. Edgar

Mr. A. H. Mackley has been elected a director of the Ignanic Electric Co., Ltd., and **Mr. R. K. Fleming** has been appointed general manager of the Bedford works in succession to the late Col. B. I. Rolling.

Mr. C. T. Payn, electrical assistant with Robert White & Partners, Consulting Engineers, Westminster, has been appointed electrical engineer at the works of Thomas Bolton & Sons, Ltd., Froghall, North Staffordshire, and takes up his duties there on December 1st.

Obituary

Mr. F. J. MacGregor.—We regret to announce the death of Mr. F. J. MacGregor, who was senior partner in the firm of MacGregor & McCallum, Ltd., of 1, Newman St., London, W.1.

Monsieur C. Iung.—The death recently occurred in Paris at the age of seventy-seven years of Monsieur Charles Iung, the president of the French Syndicat Professionnel des Fabricants de Fils et Cables Electrique, and for many years associated with the Société des Téléphones, of Paris.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

C. A. Newton & Co., Ltd.—Private company. Registered November 9th. Capital, £10,000. Objects: To acquire the business of an electrical engineer carried on by C. A. Newton at Derby as C. A. Newton & Co., and to carry on the business of dealers in electric and other lamps, radiators, fires, cookers, irons, vacuum cleaners, &c. The directors are: C. A. Newton, address not stated; J. W. Furniss, "Mayfield," Haslams Lane, Darley Abbey, Derby; G. F. Nuttall, 19, St. James's Street, Derby; and T. Reeves, address not stated. Solicitors: Flint, Marsden & Bishop, 42, Full Street, Derby.

N. R. H. S. (Western Counties), Ltd.—Private company. Registered November 11th. Nominal capital, £5,000. Objects: To acquire the whole rights, &c., of that part of the business of radio hire service carried on by the Oxford Broadcasting Relay, Ltd., Weston-super-Mare Radio Relays, Ltd., Treve Radio Relay, Ltd., Merlin Radio and Television Relay Service, Ltd., Mid-Glamorgan Relay Services, Ltd., and T. F. W. Lincoln, L. R. Moss and W. F. Reid, carrying on business as N. R. H. S. (Cardiff). The subscribers are: E. Rudland and E. Sanders, both of 2, Bond Court, Walbrook, E.C.4. The amount borrowed by the directors is restricted to an amount not exceeding the nominal share capital. Registered office: 185, Cowley Street, Oxford.

Electric House (Denton), Ltd.—Private company. Registered November 8th. Capital, £1,500. Objects: To acquire the business of an electrical contractor carried on by P. L. Barr, &c. The permanent directors are: P. L. Barr and E. Barr, both of 10, Mayfield Avenue, Haughton Green, Denton. Registered office: Electric House, 42, Ashton Road, Denton, Manchester.

British Epok Signs, Ltd.—Private company. Registered November 8th. Capital, £7,500. Objects: To take from Reklamaktiebolaget Epok of Sweden a licence to buy, sell, hire, manufacture and deal in electric signs, advertising signs and electrical apparatus and equipment; sign makers, writers and fixers, &c. The subscribers are: A. L. Walsh, C. H. Scott, and S. J. Constance, all of 18, Austin Friars, E.C.2. Solicitors: Slaughter & May, 18, Austin Friars, E.C.2.

Axis, Ltd.—Private company. Registered November 13th. Capital, £300. Objects: To carry on the purchase and sale of merchandise of all kinds; representation of British firms in Poland and any other operations; manufacturers of electrical lamps, batteries and other electrical appliances, &c. The directors are: E. Wolski, 5, Saint Giles High Street, W.C.2, M. Cieplinski, 241, Cromwell Road, S.W.5. Secretary: Frank T. Cornish, 62, Heybridge Avenue, Streatham, S.W.16.

Reconditioned Radio, Ltd.—Private company. Registered November 10th. Capital, £1,000. Objects: To carry on the business of wholesale and retail dealers in radio and television instruments, &c. The directors are: E. R. Worley, 60, Front Street, Chester-le-Street, and four others.

Sphere Radio Service, Ltd.—Private company. Registered November 13th. Capital, £500. Objects: To carry on the business of manufacturers and retailers of radio and television apparatus, electrical goods, &c. The permanent directors are: H. Jones, 26, Holly Hedge Road, West Bromwich, and A. A. Jones, 118, Walsall Road, West Bromwich. Solicitors: Bowman & Evans, 12, Waterloo Street, Birmingham, 2.

Returns of Electrical Companies

Anglo-Argentine Tramways Co., Ltd.—Capital, £11,000,000 in 800,000 1st preference shares of £5, 710,000 2nd preference shares of £5, and 862,500 ordinary shares of £4. Return dated August 12th, 1937. 640,000 1st preference, 610,000 2nd preference, and 675,000 ordinary shares taken up. £850,000 paid on 20,000 1st preference and 150,000 ordinary shares, £8,100,000 considered as paid on the remainder. Mortgages and charges: £70,660 annuity, £4,465,674 4 per cent. debenture stock, £1,733,380 4½ per cent. debenture stock, and £6,000,000 5 per cent. debenture stock.

Allen West & Co., Ltd.—Particulars filed of debenture stock to secure £225,000 with a premium of 1 per cent. authorised July 14th, 1937, and covered by trust deed dated October 20th, 1937, charged on properties in Woolston, Southampton and Preston, Brighton, shares in various companies, and the company's undertaking and other property, present and future, including uncalled capital, the whole amount being now issued. Trustees: British Trusts Association, Ltd., 17, Saint Helens Place, E.C.

Reason Manufacturing Co., Ltd.—Debenture, charged on land at Brighton, and all other freehold and leasehold property (subject to a charge thereon), and the company's undertaking and other property, present and future, including uncalled capital, dated October 20th, 1937, to secure £20,000. Holders: Allen West & Co., Ltd., Lewes Road, Brighton.

Young Accumulator Co. (1929), Ltd.—Capital, £225,000 in 2,250,000 ordinary shares of 2s. Return dated August 12th, 1937. 1,934,792 shares taken up. £162,530 17s. 4d. paid on 1,625,308⅔ shares, £30,948 6s. 8d. considered as paid on 309,483⅓ shares. Mortgages and charges nil.

L. G. Hawkins & Co., Ltd.—The nominal capital has been increased by the addition of £20,000 in £1 ordinary shares beyond the registered capital of £5,000.

Bylock Electric, Ltd.—Mortgage on freehold premises known as Bylock Hall Works, at Ponders End, Enfield, Middlesex, dated November 5th, 1937, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Turner, Atherton & Co., Ltd.—Capital, £140,116 in 62,861 preference and 77,255 ordinary shares of £1. Return dated August 14th, 1937. 49,172 preference and 51,597 ordinary shares taken up. £26,487 paid on 19,228 preference and 7,259 ordinary shares. £74,282 considered as paid on the remainder. Mortgages and charges nil.

Electric & General Investment Co., Ltd.—Capital, £201,500 in £60,000 ordinary stock and 141,500 ordinary shares of £1. Return dated July 14th, 1937. £60,000 ordinary stock taken up. £22,000 paid (£1 on £20,000 stock and 1s. on £40,000 stock). £38,000 considered as paid (19s. on £40,000 stock). Mortgages and charges: £97,980.

Utilities (London), Ltd.—The nominal capital has been increased by the addition of £24,000 in £1 ordinary shares beyond the registered capital of £1,000.

Lancashire and Cheshire Twinlamp Co., Ltd.—Debenture charged on the company's assets, present and future, including uncalled capital, dated October 15th, 1937, to secure £750. Holder: Mrs. Frost, The Dene, Hoole Road, Chester.

City Notes

Electric & Musical Industries, Ltd., held its annual meeting on November 12th when Mr. A. Clark (chairman), who presided, said that sales for the trading year had shown an increase over those of the previous period. Their sales of radio sets and accessories during the year contributed the greater part of their total profits and accounted largely for their increase. Side by side with their manufacturing and sales departments a comprehensive service organisation had been built up to protect and further the goodwill of all the group of products. With regard to the current year the sales for July, August, September and October showed an increase over those of the corresponding months last year. Dealing with the television side of the business, Mr. Clark said that the mobile equipment ordered by the B.B.C. had been completed and was employed in the televising of the Coronation procession at Hyde Park Corner. Work on the "Emitron" camera had proceeded with success and they had supplied the "Emitron," with its equipment, which was being installed in the new high-power television transmission station at the Eiffel Tower, Paris. Discoveries by their scientists and engineers had enabled them to achieve a considerable advance on the standard "Emitron" camera, which would be of great importance in television broadcasting. The sensitivity of this new instrument was approximately ten times greater than that of the standard "Emitron." Sales of television receiving sets had been disappointing, the chief reason being the large proportion of programmes which were being sent out which had little or no entertainment value. Television was being held back because of a lack of the necessary grant of funds for its exploitation. Such a grant should be sufficient to enable the B.B.C. to provide longer programmes with artistes of first rank and adequately to equip and carry on the necessary technical services in the studios.

Dictograph Telephones, Ltd., held its annual meeting on November 10th, when Lt.-Col. Sir Emanuel Hoyle (chairman), who presided, said that both the volume of business done and the net profits made were record figures. A substantial part of their business consisted of the investment of capital in Dictograph telephone installations returnable over a period of years in the form of annual income, and he stressed the heavy charges against the current year's profits as a result of an increase of 40 per cent. in the volume of new rental business undertaken as compared with the previous year. Their technical staff had improved the design and operation of Dictograph telephones during the year. Increased demand from the export trade, as well as at home, had made it necessary to increase the rate of factory production during the year. The number of new users of Dictograph telephones had been well maintained and many firms and municipal undertakings had placed contracts with the company.

Electrical Switchgear & Associated Manufacturers, Ltd., reports a profit for the year ended October 31st of £21,381, as compared with £14,303 for the period from May 14th, 1936, to October 31st, 1936, to which is added £3,226 brought in. The final ordinary dividend is 10 per cent., making 16 per cent. for the year, and £4,404 is carried forward. The accounts of Brookhirst Switchgear, Ltd. (the subsidiary) show a profit for the year to July 31st, 1937, of £51,301. Of this £14,000 was reserved for tax and N.D.C., leaving £37,301, which enabled an increased dividend to be distributed to the parent company and £14,384 to be added to £14,761 brought in. The report states that the programme sanctioned for extensions to buildings and equipment of the Chester works has proceeded with all speed. The new expenditure by Brookhirst Switchgear, Ltd., on buildings, plant and machinery, and for the purchase of houses and land, to October 31st was £26,468. The enlarged facilities in room and equipment have been occupied as rapidly as they became available and have contributed to the marked improvement in the year's results. Meeting: November 25th.

Burco, Ltd., reports a net profit for the four months to September 30th, 1936, of £5,456, and for the year ended September 30th this year of £24,763. In the year to June 30th, 1936 (according to the offer for sale issued in October, 1936), the profit was £25,200, struck after allowing for directors' fees, depreciation and provision for repairs, but before charging taxation. Directors' fees, income tax, N.D.C. and depreciation absorb £12,458, a sum of £5,342 being profits earned from June 30th to September 28th is placed to capital reserve, and tax reserve receives £3,000. The final dividend is 12½ per cent., making 20 per cent. for the year, and £6,126 is carried forward. The report states that the volume of business transacted during the past twelve months constitutes a record, and the value of orders in hand at the end of September was substantially in excess of the corresponding figure in 1936.

Drake & Gorham, Ltd., report a net profit for the year ended June 30th of £9,563, as compared with £7,672 in the preceding year, to which is added £2.264 brought in. The dividend for the year is 2½ per cent. This compares with 2 per cent. in 1931-32, when the last dividend was paid. A sum of £3,139, capital profits accumulated in past years, is placed to capital reserve, general reserve receives £3,500, and £2,063 is carried forward. The directors have applied a special reserve of £3,750 and £5,750 from general reserve to writing down the value of shares in the subsidiary to £60,000. During the year £1,009 5½ per cent. debenture stock was redeemed.

Radio Rentals, Ltd., in its first accounts shows a profit for the year ended August 31st of £88,816, as compared with £70,887 for the preceding year, as given in the prospectus. The net profit, before allowing for interest and tax, is £25,016 (against £21,094), which is reduced to £22,406 after deducting interest on loans to the vendor company. A sum of £500 is placed to special stock reserve, £5,923 is provided for N.D.C., and a final ordinary dividend of 7½ per cent. is paid, making 12½ per cent. for the year. The balance carried forward is £3,122. Out of a share premium account of £13,000 the whole of the preliminary expenses (£12,808) are written off.

Yarrow & Co., Ltd., report a profit for the year ended June 30th last of £30,511, as against £36,329 in the preceding year. A sum of £23,514 is brought in, as compared with £24,684, and £5,000 (£15,000) has been transferred to general reserve. The dividend remains unchanged at 10 per cent., as does the bonus at 5 per cent., leaving £26,525 to be carried forward. The report states that during the year under review the boiler department was fully occupied, while buildings and plant were further developed.

Scophony, Ltd., states in its report covering the year to March 31st that it has continued the technical development of its inventions. Throughout the period under review £35,365 has been spent, and a sum of £1,636 advanced to its subsidiary, Scophony Electronics, Ltd., for development. No profit and loss account is available and the directors will not receive any remuneration for the past year. However, a resolution to provide for directors' fees during the current year will be submitted to the annual meeting.

Heenan & Froude, Ltd., report aggregate profits, including the subsidiary, Court Works, of £41,361, before tax, for the year ended August 31st. The net profit of the company was £35,525, less tax provision (£6,540), making £28,985, to which is added £10,200 brought in. The final dividend is 6 per cent., less tax, making 10 per cent., staff superannuation receives £6,000, and general reserve £4,914. The balance carried forward is £16,946. The company is to issue 300,000 5s. ordinary shares at 5s. 6d. each in the proportion of one for every two held. Application lists will close on November 22nd. The new shares will rank for dividend as from September 1st last. The issue has been underwritten.

Britannia Electric Lamp Works, Ltd.—Lists for an offer for sale by the Braemore Trust of 450,000 ordinary shares of 5s. each were to open and close yesterday (Thursday). The shares were offered at 8s. 6d. per share and the directors and their friends have taken up 220,000 of the shares, leaving 230,000 for the public. The registration of this company was recorded in our last issue; the chairman is Mr. J. Ismay (chairman and managing director of Ismay Industries, Ltd.). The prospectus states that the company handles approximately 10,000,000 lamps per year, and it also has a large turnover in electrical accessories. Additional plant is being installed which will enable the total output to be increased to approximately 15,000,000 lamps a year.

British Industrial Plastics, Ltd., reports a net profit for the year ended September 30th of £31,098 (against £27,457), after providing £22,558 for depreciation, obsolescence and reserve for taxation. The ordinary dividend is maintained at 8 per cent., and £4,173 is carried forward (against £2,807 brought in).

The Ever Ready Co. (Ireland), Ltd., states that owing to increases in the cost of labour and material it has been decided to await the results of a full year before recommending a dividend on the ordinary shares. Last year the interim dividend was 5 per cent.

Sydney S. Bird & Sons have announced a final dividend of 17½ per cent. for the period from the date of incorporation to September 30th. The total distribution for the period is at the annual rate of about 28½ per cent.

The Associated Equipment Co. has declared a final dividend of 13d. per unit of £1 stock, free of tax, making 1s. 6d. per unit for the year (same).

The Electric Furnace Co., Ltd., has declared an interim dividend of 2½ per cent. (same).

The Palestine Electric Corporation has declared an interim dividend of 2½ per cent., tax free (same).

The Plessey Co. is paying a final ordinary dividend of 10 per cent., making 20 per cent. for the year ended June 30th.

Stocks and Shares

TUESDAY EVENING.

BUSINESS activities in the Stock Exchange are impeded by a continuance of the uncertainties which have overhung markets for some time past. The outstanding feature is the manner in which safety-first stocks are being absorbed. New issues from borrowers who offer gilt-edged securities are readily taken. It is thought that the Government may have a substantial slice of National Defence Bonds in preparation for launching at the appropriate moment.

Events in the Americas, in the Far East and in Spain are not conducive to a return of that confidence without which Stock Exchange prices cannot be expected to go ahead. It is natural, in the circumstances, that the volume of daily business should be diminished by the caution imposed upon initiative. Investors nowadays expect a reasonable rate of interest on money employed in the industrial shares which, a year ago were so popular, and the prices of which were run up until it became obvious that, in the matter of yield, too narrow a gap existed between the return obtainable from safety-first stocks and that offered by ordinary shares.

Safety First Markets

With investment still chary of even slightly speculative markets, the steady flow of funds into safety-first channels has continued unabated. Much of the buying is on general public account, but the big institutions are also using a freer hand and the speculatively-minded are becoming daily more interested by the strength of gilt-edged prices. It is likely, too, that foreign money feels little desire to venture yet awhile from the security of first-class British stocks. Prices of Government issues show, on the week, a further advance, and firmness has spread to other sections of the market. London Transport issues were inclined to improve on the previous week's rises. The 5 per cent. "B" stock is up to 120½, or

3 points higher than a fortnight ago. Central Electricity Board stocks are firm, the prices being in some instances rather better than the official quotations given in our lists. Kent Electric 3½ per cent. debenture, issued last week at 96, rose to ⅛ premium before reacting to $\frac{9}{16}$ premium. Industrial debentures and preference shares of sound character are not easy to come by in anything like quantity.

Industrial Markets

On the week's events in America and other parts of the world, industrial markets have had at times their brighter moments. Business in the shares has, however, failed to open up, and the lists of prices show, as a result, few signs of returning vitality. Idle conditions in the electricity supply market have allowed plenty of leisure to read, with satisfaction, the Electricity Commissioners' annual report. Some of the conclusions reached by the Commissioners have been adopted to strengthen the case for reorganisation of the industry on lines nearer to the McGowan Committee's recommendations than to the Government's suggestions. Electrical equipment and manufacturing shares were backward in taking a lead from General Electrics, which advanced from 78s. to 79s. Crompton Parkinsons have their ups and downs while awaiting the dividend and report: the price recovered this week to $2\frac{9}{16}$ after being 2⅜. Among the cable manufacturing issues, Johnson and Phillips, at 42s. 6d., and British Insulated, at 4⅜, are each $\frac{1}{16}$ down. There is no change in Crabtree Electrical, at 28s., to mark the good impression made by the company's first report.

Brazilian Bombshell

Holders of Brazilian stocks of all kinds are disturbed by Dr. Vargas's coup and by his subsequent pronouncements. The decision to default on the country's external loans was followed by a temporary suspension of dealings in all Brazilian bonds on the London Stock Exchange. Some uneasiness is evident over the question of the new Dictator's attitude towards private enterprises controlled or financed by non-Brazilian money. So far, his expressions of nationalistic intentions have singled out the foreign banks and insurance companies. Holders of investments in other kinds of businesses do not, however, feel altogether safe from interference. This feeling found rather violent expression in a slump of about 6 dollars in the shares of the Brazilian Traction company, which has utility interests throughout the country, and whose shares are a popular counter in most of the world's bourses. The quotation collapsed from 17⅛ to 11⅛ before a rally to 12⅞ followed calmer consideration of the position. The general disposition is, indeed, to await events with less pessimism than was induced by the first shock. It is difficult to believe that Brazil will throw away what support remains for its credit in foreign countries.

Communication Stocks

Cable and Wireless ordinary has picked up a couple of points, to 66½, but remains 20 points below the level at which it stood shortly after the capital reconstruction of the combine. The preference and funding stocks are steady at the common level of 101¼. Globe Telegraph ordinary shares shed 5s. to 15¾. Transatlantic communication stocks moved up on American buying. American Telephone and Telegraph rose from 148½ to 152½, and Western Union from 29 to 30. International "Tel. and Tel." spurted from 6¾ to over 8, before reacting to 7¼, on revival of hopes concerning Spain, where the company has interests. Canadian Marconi at 5s. 6d. are 6d. up. There is a small improvement also in Anglo-Portuguese Telephones at 23s.

Radio and Television

Radio and television shares have been out of favour for some time past as a result of lack of interest in this particular section. The market continues, nevertheless, to speculate increasingly on the commercial possibilities of television to the companies concerned. Close attention was given, accordingly, to what the chairman of Electric and Musical Industries had to say at the meeting on progress and prospects in that part of the company's widening field of activities. Despite satisfaction with his review of the general situation, the price of "Emmies" remains dull at 17s. 9d. The price of E. K. Coles, which carry a big interest in Scophony, stand at 9s. 6d., after having been depressed to 8s. 6d: there have been fears of a reduction in the interim dividend. Prices of radio shares are at levels which show high yields on last year's distributions. Baird Television preferred ordinary are quoted at 9d. and the deferred at 1s. 6d.

On Offer

A yield of 5 per cent. on the money is afforded by Cornwall Power 7 per cent. non-cumulative preference shares, now on offer at 28s. per share. The return is anything up to 1 per cent. higher than can be obtained from more fully protected preference shares in the electricity supply list. The Cornwall company has perpetual powers to supply electricity throughout the county and has substantially expanded its output in recent years. For last year a dividend of 5 per cent. was paid on the ordinary shares, and the accounts showed profits sufficient to pay the preference dividend two and a half times over. The comparatively generous return on the preference shares offers attraction to those willing to invest outside the purely safety first sphere.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Dividend. Last.	Price Nov. 16.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	67/6	—	4 9 0
City of London	1	7½	7½	34/6	—	4 7 0
Clyde Valley	1	7	8	2	+6d.	4 0 0
County of London	1	10½	10½	49/-	—	4 5 9
Edmundson's 7% Pref.	1	7	7	33/6	—	4 3 7
Do. Ord.	1	8	9	39/-	—	4 12 4
Elec. Dis. Yorkshire	1	9	9	41/6	—	4 6 10
Elec. Fin. and Securities	1	12½	12½	2⅝	—	4 15 3
Elec. Supply Corporation	1	11	12	52/-	—	4 12 5
Lancs Light and Power	1	7½	7½	33/-	—	4 11 0
Lond. Assoc. Electric	1	—	7	31/3	—	4 9 6
London Electric	1	7	8	35/6	—	4 10 2
London Power Deb. Red.	Stock	5	5	106½	—	4 14 0
Metropolitan	1	10	10	46/-	—	4 7 0
Midland Counties	1	7½	8	37/6	+6d.	4 5 6
Mid. Elec. Power	1	8	9	2½	—	4 4 8
North Eastern Electric Ordinary	1	6	7	32/-	—	4 7 6
Do. 7% Pref.	1	7	7	34/-	—	4 2 4
Northampton	1	10	10	45/-	—	4 9 2
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	48/3	—	4 3 1
Do. do. 6% Pref.	1	6	6	30/-	—	4 0 0
Scottish Power	1	8	8	37/-	—	4 6 6
South London	1	7	7	32/-	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/-	—	7 2 10
Yorkshire Elec.	1	8	8	2	—	4 0 0
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	113	—	4 8 6
Do. 1955–75	,,	5	5	115	—	4 7 0
Do. 1951–73	,,	4½	4½	110	—	4 1 10
Do. 1963–93	,,	—	3½	98	—	3 11 5
London Elec. Trans. Gtd.	,,	—	2½	90	—	2 15 6
London & Home Counties, 1955–75	,,	4½	4½	109	—	4 2 7
London Passenger Transport, A.	,,	—	4½	116½	+2	3 17 3
Do. do. B.	,,	—	5	120½	+1	4 3 1
Do. do. C.	,,	4	4½	81	+1	5 5 0
West Midlands Joint Elec. 1948–68	,,	—	5	112	—	4 9 3
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	152½	+4	5 18 0
Anglo-Am. Tel. Pref.	Stock	6	6	115½	+1	5 4 0
Do. Def.	,,	1½	1½	28½	—	5 5 3
Cable & Wireless 5½% Pref.	,,	4½	5½	101½	—	5 9 5
Do. Ord.	,,	—	—	66½	+2	—
Do. Income	,,	—	—	101½	—	3 18 10
Globe Tel. & Tel. Ord.	10	4½*	5½*	15½	−¼	3 9 8
Do. do. Pref.	10	6	6	14	—	4 5 9
Great Northern Tel.	10	20	20	38	−½	5 5 3
Marconi-Marine	1	10	7½	31/3	−⅛	4 16 0
Oriental Telephone Ord.	1	12*	12*	2⅜	−$\frac{1}{16}$	4 3 6
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	6/3	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	17½	−2	—
British Electric Traction Def. Ord.	,,	5	5	1075xd.	+4	—
Do. do. Pref. Ord.	,,	8	8	165xd.	—	4 17 0
Brazil Traction	$100	40 cts.	50 cts.	12⅞	−3⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	105½	—	4 14 9
Mexican Light Common	$100	Nil	Nil	2	—	—
Do. 1st Bonds	$500	5	5	33	—	—
Victoria Falls Ord.	1	20	12	3⅛	—	3 18 5
West Riding	1	6½	10	2	—	5 0 0
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	2½	—	6 13 4
Assoc. Elec. Ord.	1	8	10	43/-	+6d.	4 13 1
Do. Pref.	1	8	8	37/6	—	4 5 3
Babcock & Wilcox	1	8	10	42/-	−1/9	4 15 3
British Aluminium Ord.	1	7½	10	45/9	−⅛	4 7 6
British Insulated Ord.	Stock	20	20	4⅜	−⅛	4 6 6
Brush Ord.	Stock	Nil	Nil	27½	—	—
Callender's	1	15	15	4½	—	3 6 8
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/-	12½	12½	2 $\frac{5}{16}$	+$\frac{1}{16}$	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	1⅞	+⅛	5 6 8
Enfield Cable Ord.	1	25	25	5½	—	4 17 8
English Electric	1	Nil	Nil	30/-	−1/-	—
Do. do. Pref.	1	6½	6½	26/6	—	4 18 1
Ericsson Tel.	5/-	20	25	2½	−⅛	2 18 10
Ever Ready	5/-	35	45	28/6	—	7 18 0
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	15	17½	79/-	+1/-	4 8 9
Henley's	5/-	30	15	1	—	3 15 0
Do. 4½% Pref.	1	4½	4½	1¼	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	7½	10	42/6	−⅛	4 14 1
Lancashire Dynamo	1	10	20	3⅜	—	5 18 6
Siemens Ord.	1	6	7½	30/-	—	5 0 0
Telegraph Construction	£1	Nil	7½	2½	—	3 6 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1936

1867. "Electric cables." Allgemeine Elektricitäts Ges. January 19th, 1935. (473832.)

4647. "Electric systems for controlling the position of a controlled object." Sperry Gyroscope Co., Inc. February 16th, 1935. (473753.)

9480. "Oscillators for scanning or like purposes." Ferranti, Ltd., and E. G. O. Anderson. March 31st, 1936. (473836.)

11085. "Systems employing electric-discharge devices." British Thomson-Houston Co., Ltd. April 17th, 1935. (Addition to 448833.) (473889.)

11190. "Cathode-ray tubes." V. Zeitline, A. Zeitline and V. Kliatchko. April 19th, 1935. (473893.)

11274. "Cathode-ray tubes and like electron-discharge devices." Fernseh Akt.-Ges. April 18th, 1935. (473844.)

11278. "Braking of electric railless trolley vehicles." General Electric Co., Ltd., and E. H. Croft. April 20th, 1936. (474023.)

11286. "Apparatus for automatic current regulation in alternating-current circuits." S. A. Stevens and Westinghouse Brake & Signal Co., Ltd. April 20th, 1936. (473845.)

11332. "Electric arc convertors." Allgemeine Elektricitäts Ges. April 18th, 1935. (474031.)

11346. "Thermionic valve amplifiers." Baird Television, Ltd., and L. C. Bentley. April 21st, 1936. (473895.)

11347. "Radio receivers." Baird Television, Ltd., and L. R. Merdler. April 21st, 1936. (473896.)

11396. "Electric power supply systems." General Electric Co., Ltd., H. J. Coates and C. C. Garrard. April 21st, 1936. (474035.)

11517. "Electric heating devices for type-composing machines." K. Bader. April 22nd, 1936. (474044.)

11536. "Magnetic rotary devices for generating, or comparing the frequencies of, continuous oscillations." E. Ruspoli. April 22nd, 1936. (473977.)

11607. "Television and like receiving apparatus." Baird Television, Ltd., and J. L. Baird. April 23rd, 1936. (473980.)

11616. "Control systems for synchronous electric motors." British Thomson-Houston Co., Ltd., and J. H. Walker. April 23rd, 1936. (473981.)

11620. "Electric vacuum devices such as cathode-ray tubes." General Electric Co., Ltd., and L. C. Jesty. April 23rd, 1936. (473849.)

11628. "Electric switches suitable for operation by the passage of road vehicles." Automatic Electric Co., Ltd. (in liquidation), S. R. Smith and C. H. Brizell. April 23rd, 1936. (473982.)

11641. "Installations for illuminations." Soc. Anon. pour les Applications de l'Electricité et de Gaz Rares Etablissements Claude-Paz & Silva. February 7th, 1936. (474047.)

11643. "Train-operated electric contact devices." J. Fryba. April 23rd, 1936. (474048.)

11663. "Automatic regulating apparatus for direct-current dynamos working in parallel." R. Bosch Akt.-Ges. April 27th, 1935. (Addition to 436429.) (473985.)

11776. "Combined wire ropes and electric conductors and a method of constructing them." W. T. Wells. April 24th, 1936. (474054.)

13460. "Safety device applicable to electrical signalling systems employed in conection with mine hoists." Metropolitan-Vickers Electrical Co., Ltd. (Metropolitan-Vickers Electrical Export Co., Ltd.). May 12th, 1936. (473771.)

13957. "Terminals for the mouthpiece elements of electrically heated type-composing machines." K. Bader. May 16th, 1936. (474059.)

14541. "Public address systems." Receiver for Metropolitan Police District and E. C. Brown. May 22nd, 1936. (473776.)

14606. "Scanning systems for television and the like." Scophony, Ltd., and J. H. Jeffree. May 23rd, 1936. (473907.)

15043 "Apparatus for protecting polyphase alternating-current electric circuits." Brookhirst Switchgear, Ltd., and C. Lanceley. May 28th, 1936. (473778.)

15045. "Telemotor apparatus." Donkin & Co., Ltd., W. S. Paulin and E. Storey. May 28th, 1936. (473909.)

15115. "Vertically-withdrawable oil switches." General Electric Co., Ltd., and A. M. Anderson. May 28th, 1936. (473779.)

15503. "Scanning devices, particularly for television purposes." E. Traub. June 3rd, 1936. (473910.)

15563. "Electrically maintained tuning-fork apparatus." W. P. Wilson. June 3rd, 1936. (473780.)

17058. "Switching devices for use in telephone systems." General Electric Co., Ltd., C. C. Puckette and A. Warrington. June 19th, 1936. (473915.)

17977. "Self-flashing electric-discharge lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. June 29th, 1936. (473918.)

19065. "Electric lamps or the like." British Thomson-Houston Co., Ltd. July 10th, 1935. (474004.)

19153. "Electric controllers." Igranic Electric Co., Ltd. September 6th, 1935. (473787.)

20213. "Automatic track relay signalling systems for railways." Vereinigte Eisenbahn-Signalwerke Ges. August 10th, 1935. (473717.)

20909. Cathode-ray and photo-electric discharge tubes." British Thomson-Houston Company, Ltd. July 29th, 1935. (473789.)

22223. "Electric-discharge devices." British Thomson-Houston Co., Ltd. August 12th, 1935. (473792.)

23219. "Mountings for dynamo-electric machines." British Thomson-Houston Co., Ltd. August 24th, 1935. (Addition to 442804.) (473724.)

23517. "Electric motors." Mather and Platt, Ltd., and J. H. Whitelock. August 27th, 1936. (473796.)

23934. "Cooling means for electric-discharge devices." M-O Valve Co., Ltd., and D. A. Boyland. September 1st, 1936. (473797.)

24496. "Electric cables." Zeiss Ikon Akt.-Ges. October 22nd, 1935. (473798.)

26285. "Electro-magnetic driving mechanism." A. Strahm. March 27th, 1936. (473799.)

26869. "Method of, and means for, forming a magnetic circuit for ignition magnetos." Fabrica Italiana Magneti Marelli. October 4th, 1935. (473926.)

29555. "Radio directing and direction-finding systems." Standard Telephones & Cables, Ltd. December 31st, 1935. (473807.)

29567. "Combinations of electric-discharge devices with material adapted to be excited to luminescence by the radiation therefrom." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Gluhlampen). October 30th, 1936. (Cognate application 3486/37.) (473929.)

35175. "Loudspeakers." General Electric Co., Ltd., A. Jones and S. Littlemore. December 22nd, 1936. (473936.)

35368. "Electrical resistance." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 28th, 1935. (473743.)

1937

1372. "Electrostatic production of high voltages." Aktiebolaget Elektrolux. January 17th, 1936. (473857.)

1617. "Hydro-electric power plants employing synchronous generators." Siemens-Schuckertwerke Akt.-Ges. January 8th, 1937. (473859.)

3489. "Modulating or demodulating apparatus for alternating-current signalling systems." Siemens & Halske Akt.-Ges. February 5th, 1936. (473944.)

5029. "Mounting arrangements for antennae for radio direction-finding apparatus." Standard Telephones & Cables, Ltd. April 2nd, 1936. (473866.)

6077. "Sealed electrical connections for ceramic bodies." British Thomson-Houston Co., Ltd. February 29th, 1936. (473870.)

6101. "High-vacuum electric-discharge tubes comprising in directly heated cathodes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 4th, 1936. (473951.)

7336. "Means for compensating for frequency variations due to temperature changes in thermionic-valve circuits." C. Lorenz Akt.-Ges. April 4th, 1936. (473955.)

9049. "Röntgen-ray apparatus." Siemens-Reiniger-Werke Akt.-Ges. August 13th, 1936. (473824.)

12147. "Electric resistance heaters." British Thomson-Houston Co., Ltd. April 28th, 1936. (473876.)

12374. "Connecting electric signalling circuits using different frequencies to a transmission line." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.) April 30th, 1937. (473877.)

12668. "Hydrometers, particularly for electric accumulators." Park Bros., Ltd., and J. Jowett. May 4th, 1937. (474014.)

13106. "Acoustic devices." Standard Telephones & Cables, Ltd. September 9th, 1936. (473878.)

14752. "Radio direction-finding installations." Telefunken Ges. für Drahtlose Telegraphie. May 27th, 1936. (474015.)

14890. "Control of electric motors." British Thomson-Houston Co., Ltd. May 29th, 1936. (474016.)

16130. "Electric-arc lamps having axially movable electrodes." Korting & Mathiesen Akt.-Ges. June 12th, 1936. (Addition to 451258 and 452075.) (474019.)

16756. "Multi-channel signal transmission systems." Siemens & Halske Akt.-Ges. June 18th, 1936. (474021.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 10th:—

Sinepert. No. 579502. Class 8. Electric cables for high-frequency transmission.—Steatit-Magnesia Gesellschaft, Pankow, Berlin, Germany. (British representatives: Gill, Jenning and Emery-Clayton, 51-52, Chancery Lane, W.C.2.)

Isorette. No. 580502. All goods in Class 8.—I. G. Farbenindustrie Gesellschaft, Frankfürt-am-Main, Germany. (British representatives: Abel & Imray, 30, Southampton Buildings, Chancery Lane, W.C.2.)

Moonbeam. No. 579,006. Class 8. Batteries for use with electric cycle lamps and electric pocket lamps.—Windswork Works, Ltd., 68, Venn Street, Clapham Common, S.W.4.

Vibrosan. No. 578922. Class 11. Electrically operated massage apparatus.—"Sodeco." Société des Compteurs de Geneve, Geneva, Switzerland. (British representative: Henry Fairbrother, 30-32, Ludgate Hill, E.C.4.)

Diana (lettering and design). No. 580,000. Class 13. Electric lamps (ordinary).—Société des Lampes et Entreprises Electriques, Ninove, Belgium. (British representatives: Cope & Co., 65, Victoria Street, Westminster, S.W.1.)

The "Hindenburg" Disaster

Model airships have been shown by experiments carried out in Germany to burst into flames each time (and only when) five conditions were reproduced simultaneously that are believed to have existed at New Jersey airport when the *Hindenburg* was destroyed. The *Daily Telegraph* gives these conditions as: An explosive mixture in the stern, due to insufficient ventilation of the gas-escape passages; a layer of rain on the fabric, which was insulated from the metal framework, thus making the airship a large electrical condenser; the earthing of the tow ropes while the airship was relatively high in the electrically charged atmosphere; rapid changes in earth potential due to an electric storm; and the wetting of the tow ropes by rain, causing them to conduct electricity from earth to the framework. A spark due to the difference in voltage thus produced between the frame and the moisture on the exterior is believed to have ignited the escaping hydrogen.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Extension of nurses' home, Kingseat Mental Hospital (electric lighting); city architect.

Acton.—Extensions to works, Warple Way, for Clement Talbot, Ltd.; J. B. Cowper, architect, 38, Bedford Square, London, W.C.1.

Barnstaple.—School, Vicarage Street; Oliver & Son, architects, Queen Anne's Chambers, Barnstaple.

Birmingham.—Factory, Birmingham Road, Bickenhill, for the Airlite Trailer Co., Ltd., Old Meteor works, Queen Victoria Road, Coventry; J. R. P. Cronin, architect, 65, Coventry Road, Coleshill. Offices, for the Beacon Insurance Co., Stratford Road, Hall Green; J. Bowen & Sons, builders, Balsall Heath. Schools, Tritiford Road, Billesley; Parsons & Morrin, builders, Belgrave Road, Birmingham. Cinema, The Green, Kings Norton; E. Turner, Ltd., builders, Maypole, Birmingham.

Blackpool.—Rebuilding Central Station (£1,000,000), for the L.M.S. Railway.

Bournemouth.—Houses (29), Wimborne Road; A. C. Barnes & Co. Bank, Christchurch Road; Westminster Bank, Ltd. Alterations and additions to Chine Hotel, Boscombe Spa Road; J. Millar.

Brighouse.—Houses (68), Bradford Road, Bailiffe Bridge; B. D. Fairbank & Sons, architects, Hallfield Road, Bradford.

Brighton.—Large block of shops and offices, West Street, for Progress Buildings, Ltd.; Field & Co., Ltd., contractors, 6, Hampton Place.

Bristol.—Houses (12), Two Mile Hill Road (£4,776); W. T. Leonard. Clinic, Brislington; city engineer. Estate development at Brislington; Northville Building Co.

Bromsgrove.—Development of Wheeley Farm estate; Ludlow, Briscoe & Hughes, 19, Temple Street, Birmingham.

Burbage (HINCKLEY).—Additions to factory, Coventry Road, for Supreme Hosiery Co.; E. H. Crump, architect, The Borough, Hinckley.

Cambridge.—Houses (268), Ditton Walk site; borough surveyor, the Guildhall.

Cannock.—Houses (132), Redhill site, West Chadsmoor (£52,275); Molekins & Co., builders, Cannock. Fire station (£10,940); surveyor, Council House.

Cardiff.—Houses, Ferry Road (£33,000); E. Addicott & Son. Clinics, Cambridge Crescent and Red House Crescent, Ely; G. H. Whitaker, architect, City Hall.

Caterham.—Houses (31), Buxton Lane; Keens (Beckenham), Ltd. Additions to showrooms, Croydon Road; County of London Electric Supply Co., Ltd.

Chatham.—Cinema, for Associated British Cinemas, Ltd.; W. R. Glen, architect, 30, Golden Square, London, W.1.

Chester-le-Street.—Extensions to school (£9,808); R. C. Williamson.

Coalville.—Houses (80), several sites; McCarthy, Collings & Co., architects, Central Chambers, Coalville.

Consett.—Houses (44), Eldson Terrace; T. M. Francis, 9, West Parade, Leadgate.

Coventry.—Building, Baginton airport (£7,349); city engineer.

Crewe.—Bus station, Market Square (£49,633); borough engineer.

Cumberland.—Factories, and reconditioning of factories, for West Cumberland Industrial Development Co., Ltd.; manager and secretary, 1, Scotch Street, Whitehaven.

Depwade.—Houses (127) (£46,562); W. Tickner, contractor, Sprowston, Norwich.

Derby.—Cinema (£35,000), Wiltshire Road; Midland Counties and District Estate Agency, Ltd., Chaddesden Park Road.

Droylsden.—Sewage works (£54,000); U.D.C. surveyor.

Ebbw Vale.—Cinema (2,000 seats), site at the rear of White House Cinema, for Ebbw Vale Theatres.

Enfield.—School, Hertford Road, Enfield Highway; F. Lee, architect, 7, Little Park Gardens, Enfield.

Essex.—Convalescent hospital, Pyrgo Park, Romford (£100,684); also school, Straight Road, Romford (£19,073); county architect, Chelmsford.

Gayton (CHESHIRE).—Shops, Barnston Road; Glegg Estate Development Co.

Glamorgan.—General hospital, Church Village, with electrical work; Bradshaw, Gass & Hope, architects, 19, Silverwell Street, Bolton.

Glasgow.—Alterations to cinema, Nuneaton Street; Dalmarcock Picture House, Ltd.

Golborne.—Houses (138), Lowton Road and Culcheth, &c.; A. Clough, borough surveyor, Council Offices.

Gorleston-on-Sea.—Houses (39), Koolunga estate, High Road; J. W. Godrington.

Gosforth (NORTHUMBERLAND).—Block of 50 flats on the site of the old grandstand; Cussins, Ltd., contractors, Gosforth.

Great Yarmouth.—Block of flats, clearance area, and reconstruction of bathing pool; borough engineer.

Hampshire.—School, Northend Road, Eastleigh, for the County Council; A. L. Roberts, county architect, The Castle, Winchester.

Hull.—Houses, Endyke estate (£37,200); Tarran Industries, Ltd. School, Wold Road (£18,200); G. H. Panton & Sons, Ltd.

Ilkeston.—Houses (48), Richmond Avenue; Allcock & Sisson.

King's Lynn.—Two schools (£49,343), for the E.C.; J. Cracknell, Ltd., contractors, Peterborough.

Kirkcaldy.—Baths (£40,000); burgh surveyor.

Kirriemuir.—Houses (35); J. S. Bruce, burgh surveyor, Town Hall.

Lancashire. — Schools, Brierfield (£32,362), Failsworth (£29,204), Rainford (£21,430), and Rishton (£21,030), and technical college, Ashton-under-Lyne, for County E.C.

Leatherhead.—Dwellings (60), near Oxshott Road; Park Freeholds, Ltd.

Leicestershire.—Enlargement of Ravenshurst Road school, Braunstone, for the County E.C.

Liverpool.—Houses (72), Bowring Park estate, for J. R. Ruddock, Scotland Road. Houses (110), Page Moss estate; United Estates (Liverpool), Ltd., Huyton. Houses (88), Thingwall Farm estate; Milton Estates, Ltd., Queen's Drive. Shops, Huyton House estate, Liverpool Road; J. W. Jones & Son, Ltd., 158, Allerton Road, Wavertree.

Llandudno.—Hospital, nurses' home, mortuary, &c. (£57,000); T. Lowe & Sons, Ltd., builders, Burton-on-Trent.

London.—(CAMBERWELL).—Dwellings, Sumner estate (£78,520); R. J. Rowley, Ltd., Belmont works, Belmont Avenue, N.17. (GREENWICH).—Flats (38), Coldbath Street; borough surveyor. Two-storey factory, Anchor and Hope Lane, for Kork-N-Seal, Ltd., 40, Norfolk Street, W.C.2. (HAMPSTEAD).—Houses, Garnett Road; borough engineer.

Long Ashton.—Houses (38); Maynard Froud & Stevens, architects, St. Stephens Chambers, Baldwin Street, Bristol.

Luton.—Offices, Barton, for International Aircraft and Engineering, Ltd.

Manchester.—Workshop, offices, garage and caretaker's flat, Quay Street, New Quay Street and Back Quay Street, for Globe & Simpson, Ltd., 184, West Street, Sheffield; Robert Carlyle & Co., Ltd., contractors, Elsinore Road, Old Trafford.

Middleton.—Houses (30), Highfield Drive, near Farm Way; Ashton Smethurst (Builders), Ltd., Suffield Street.

Monkseaton.—Extensions to High School (£15,400); Middlemiss Bros., Ltd.

Newcastle-on-Tyne.—Premises for the Babies' Hospital and Mothercraft Centre (£45,000); Hill & Honeyman, architects, 6, Eldon Square. Additions to the Princess Mary Hospital (£120,000); Cackett, Burns Dick & McKellar, architects, 21, Ellison Place. Extensions to Royal Victoria Infirmary (£180,000); secretary.

New Earswick (YORKSHIRE).—School (£36,000); J. L. Coverdale, architect, County Hall, Northallerton.

Newport (MONMOUTHSHIRE).—Schools, Maesglas, for the E.C.; borough architect.

Northumberland.—Schools, Belford, and South Avenue, Amble, for the County E.C.

Nottingham.—School, Bilborough (£90,763) for the E.C.

Penshaw (Co. DURHAM).—Development of estate; Hind & Sons, builders, 21, Hedworth Terrace, Shiney Row.

Peterborough.—Isolation hospital; town clerk.

Pontardawe.—Houses (21), Ynismudw; E. D. Jones, surveyor, Council House, Pontardawe.

Portsmouth.—Houses (12), Woodfield; Parker Estates.

Poynton.—Cinema, swimming pool, shops, &c., London Road; R. Bailey.

Preston.—Additions and alterations to kitchens, wards and sheds, sanitary annexes and nurses' home, new X-Ray department, Sharrow Green Hospital (£24,900); R. Williams, borough surveyor, Town Hall.

Redditch.—School; H. W. Simister, architect, Birmingham.

Romford.—Extensions to Oldchurch Hospital (£28,650); Hosking & Son, Ltd.

Rothwell (YORKSHIRE).—Extensions to the Council Offices (£7,173); N. W. Paxton, Prudential Buildings, Park Row, Leeds.

Rowley Regis.—Premises, the Cross, for Dudley Co-operative Society.

Salford.—Shirt factory, Broughton Lane, for Co-operative Wholesale Society, Ltd.; C.W.S. Building Department, Vere Street.

Sheffield.—Pavilion (£7,000), at Amateur Sports Club, Abbeydale Park; R. Cawkwell, architect, Sheffield.

Shiney Row (Co. DURHAM).—Cinema for E. J. Hinge's Cinemas, Ltd., 72, Grey Street, Newcastle-on-Tyne.

Southend-on-Sea.—School, Caulfield Road site, Shoeburyness; F. W. Smith, architect, Municipal Buildings.

Southport.—Police headquarters, fire station, courts, &c., "Woodlands" site, junction of Albert and Manchester Roads; Cooke, Thomas & Dickinson, architects, Bennett's Hill, Birmingham.

Stafford.—Houses (36), Oxford Gardens; Broadbridge Estates (Besses), Ltd., builders, Sandon Road, Stafford.

Stretford.—Library, Lostock (£5,920); H. Green & Son.

Sunderland.—Two schools, for the E.C.

Sutton Coldfield.—Additions to grammar school (£46,000), with electrical work; S. F. Swift, Ltd., builders, Alcester Street, Birmingham.

Torrington.—School; H. V. de Courcy Hague, architect, 97, Heavitree Road, Exeter.

Tring.—Extensions to factory, for Rodwells, Ltd.

Turton.—Houses (120); R. Dart, U.D.C. surveyor.

Wakefield.—Houses (200), clearance areas; housing architect.

West Bromwich.—Extensions to West Bromwich and District General Hospital (£50,000).

West Hartlepool.—Houses (80), Kendal Road estate, for the Durham and Northumberland Real Estate Co., Ltd.; Heslop & Johnson, architects, Upper Church Street. Houses (54), Ventnor Avenue and Oaklam Avenue; C. M. Yuill, builder, 20, Elwick Road.

Weymouth.—Houses (118), Quibo Lane; borough engineer.

Willenhall.—Houses (111), various sites; G. A. Waite, surveyor, Council House.

Wolverhampton.—Buildings (£30,000), Dudley Street; Lawrence & Sons, builders, Finsbury Square, London, E.C.2.

Worcester.—Gymnasium, Royal Grammar school; Governors.

Yorkshire.—School and caretaker's house, Skelmanthorpe, for West Riding C.C.; Education Officer, the County Hall, Wakefield.